Chapter 5

Input

What is input?
- Any data or instructions you enter into the memory of the computer
- Users can input data and instructions in a variety of ways

What is information?
- **Data**
  - Collection of raw unprocessed facts, figures, and symbols
- **Information**
  - Data that is organized, meaningful, and useful

Chapter 5 Objectives
- Explain how voice recognition works
- Understand how to input data into a handheld computer
- Identify the uses of a digital camera
- Describe the various techniques used for video input
- Describe the uses of PC video cameras and Web cams
- Explain how scanners and other reading devices work
- Identify alternative input devices for physically challenged users

What are two types of input?
- **Data**
  - A collection of raw unprocessed facts, figures, and symbols
- **Instructions**
  - Programs
  - Commands
  - User responses

What are the three forms of input?
- **Program**
  - A series of instructions that tells a computer how to perform the tasks necessary to process data into information
- **Command**
  - An instruction given to a computer program
  - Users can issue commands by typing or pressing keys on the keyboard, clicking a mouse button, speaking into a microphone, or touching an area of a screen
- **User response**
  - An instruction you can issue by replying to a question that a computer program displays

Chapter 5

Input

What is input?

What is information?
What is Input?

What are two features of most programs today?
- Menu-driven program
  - Provides menus as a means of entering commands
  - Menus contain a list of options from which you select
- Graphical user interface (GUI)
  - Uses icons, buttons, and other graphical objects that allow you to select and issue commands

What are Input Devices?

What is an input device?
- Any hardware component that allows you to enter data, programs, commands, and user responses into a computer

What is a keyboard?
- An input device that contains keys you press to enter data into the computer
  - Typing area
    - Letters of the alphabet, numbers, punctuation marks, and other basic keys
  - Numeric keypad
    - Calculator-style arrangement of keys
  - Function keys
    - Special keys programmed to issue commands to a computer

What are the features of a typical keyboard?
- NUM LOCK key
- Function keys
  - SHIFT, CTRL, ALT, and others
    - Used in combination with other keys to issue commands
  - Toggle key
    - Switches between two different states such as the NUM LOCK or CAPS LOCK keys
  - Keys to position the insertion point
    - Insertion point is a symbol that indicates where on the screen the next character you type will display

What are some special types of keys?
- SHIFT, CTRL, ALT, and others
- Used in combination with other keys to issue commands

What are alternative forms for commands?
- Many programs allow you to use a button, a menu, or a function key to obtain the same result

<table>
<thead>
<tr>
<th>Command</th>
<th>Button</th>
<th>Menu</th>
<th>Function Key(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copy</td>
<td>Edit/Copy</td>
<td>Shift+F2</td>
<td></td>
</tr>
<tr>
<td>Open</td>
<td>File/Open</td>
<td>Ctrl+F12</td>
<td></td>
</tr>
<tr>
<td>Print</td>
<td>File/Print</td>
<td>Ctrl+Shift+F12</td>
<td></td>
</tr>
</tbody>
</table>
What are the different types of keyboards?

- QWERTY keyboard: Standard computer keyboard named for the layout of its typing area.
- Enhanced keyboard: Includes 12 function keys along the top, 2 CTRL keys, 2 ALT keys, and a set of arrow and additional keys between the typing area and the numeric keypad.
- Cordless keyboard: Battery-powered device that transmits data using wireless technology.
- Notebook and many handheld keyboards: Built into the top of the system unit.

What is a portable keyboard?

- A full-sized keyboard you conveniently can attach and remove from a handheld computer.

What is an ergonomic keyboard?

- Designed to minimize strain on your hands and wrists.
- Ergonomics incorporates comfort, efficiency, and safety into the design of items in the workplace.

What is a pointing device?

- An input device that allows you to control a pointer on the screen.
- A pointer is a small symbol on the screen.
- The pointer takes several shapes.

What is a mouse?

- A pointing device that fits comfortably under the palm of your hand.
- The most widely used pointing device on desktop computers.
- The mouse controls the movement of the pointer, also called the mouse pointer, on the screen.

Technology Trailblazer: Douglas Engelbart

- Scientist at the Stanford Research Institute in the 1960s
- Part of a team that designed the first mouse with funding from NASA and the U.S. Department of Defense
- Filed a patent for his design in 1965, but his thinking was too ahead of his time to reach fruition.
How does a mechanical mouse work?

- A rubber or metal ball is on its underside.
- When the ball rolls in a certain direction, electronic circuits in the mouse translate the movement of the mouse into signals the computer understands.
- A mouse pad provides better traction and protects the ball from a build up of dust and dirt.

How does an optical mouse work?

- Uses devices that emit and sense light to detect the mouse’s movement.
- Some use optical sensors; others use laser.
- More precise than a mechanical mouse and does not require cleaning.
- Slightly more expensive.

How can a mouse connect to your computer?

- Cable: Attach to a serial port, a mouse port, or USB port on the computer.
- Cordless mouse: Also called a wireless mouse. Battery-powered device that transmits data using wireless technology, such as radio waves or infrared light waves.

What are some common mouse operations?

- Point
- Click
- Right-click
- Double-click
- Drag
- Right-drag
- Rotate wheel
- Press wheel button

Other Pointing Devices

- Logitech: World’s largest manufacturer of the mouse.
- Has created more than 200-million corded and cordless devices since 1981.
- Also designs, produces, and markets keyboards, optical trackballs, joysticks, gamepads, and Internet video cameras.

Company on the Cutting Edge
Other Pointing Devices?

What is a trackball?
- A stationary pointing device with a ball on its top
- To move the pointer, you rotate the ball with your thumb, fingers, or the palm of your hand

What is a touchpad?
- Also called a trackpad
- A small flat, rectangular pointing device that is sensitive to pressure and motion
- Typically built onto keyboards of laptop or notebook computers

What is a pointing stick?
- A pressure-sensitive pointing device shaped like a pencil eraser that is positioned between keys on the keyboard

What are a joystick and a wheel?
- Help the user control the actions of players and vehicles in game and simulation software
- A joystick is a vertical lever mounted on a base
  - You move the lever in different directions to control the actions of a vehicle or player
- A wheel is a steering-wheel type input device
  - You turn the wheel to drive a car, truck, or other vehicle
- Most include foot pedals

What is a light pen?
- A handheld input device that contains a light source or can detect light
- Some require a specially designed monitor
- To select objects on the screen, you press the light pen against the surface of the screen and then press a button on the pen

What is a touch screen?
- A touch-sensitive display
- You interact with the device by touching areas of the screen with your finger
- Often found in kiosks located in stores, hotels, airports, and museums
Other Pointing Devices

What is a stylus?
- Looks like a ballpoint pen, but uses pressure to write text and draw lines
- Originally called a pen or electronic pen
- Used in professional graphical applications
- A graphics tablet, also called a digitizer or digitizing tablet, is a flat, rectangular, electronic plastic board used with a stylus

What is a cursor?
- A cursor is a device that looks similar to a mouse, except it has a window with cross hairs
- The user can see through the window to the tablet

What is an electronic signature?
- Also called an e-signature
- Pen and graphics tablet used with special software for handwriting recognition
- An electronic signature is just as legal as an ink signature

What is handwriting recognition software?
- Some notebooks and many handheld computers have touch screens that allow you to input data using a stylus
- Software translates handwritten letters and symbols into characters that the computer understands

Voice Input

What is voice input?
- The process of entering data by speaking into a microphone that is attached to the sound card on the computer
- Voice recognition, also called speech recognition, is the computer’s capability of distinguishing spoken words

How does voice recognition work?

Speech Recognition System

1. User dictates text into microphone.
2. An analog-to-digital converter (ADC) translates sound waves into digital measurements the computer can understand. Measurements include pitch, volume, silences, and phonomes. Phonomes are sound units such as aw and guh.
3. The software compares the spoken measurements to those in its database to find a match or list of possible matches.
4. To narrow a list down, the software presents the user with a list of choices or uses a natural language component to predict the most likely match. The user may correct any wrong selection made by the software.

Natural Language Engine

- Speaker-dependent software
  - Discrete speech: You have to speak slowly and separate each word with a short pause
  - Continuous speech: Allows you to speak in a flowing conversational tone

- Speaker-independent software

VS.

You're right!
**Voice Input**

**What is audio input?**
- The process of entering any sound into the computer such as speech, music, and sound effects
- Requires a sound card
- Input sound via a device such as a microphone, tape player, CD player, or radio
- Windows stores audio files as waveforms
  - Called WAV files with a .wav extension

**What is MIDI?**
- An external device such as an electronic piano keyboard used to input music and other sound effects
- Music is stored in the computer

**Input Devices for Handheld Computers**

**What is the primary input method for a handheld computer?**
- A handheld computer typically includes a basic stylus
- Stylus used to enter data in two ways
  - On-screen keyboard
  - Handwriting recognition software

**How is data entered into a handheld device?**
- Stylus
- On-screen keyboard
- Handwriting recognition software
- Voice input
- Digital camera
- Portable keyboard
- Transfer data to desktop computer

**Company on the Cutting Edge**

**Palm**
- More than two million people worldwide have a Palm handheld computer
- Commands three-fourths of the handheld computer market
- More than 43,000 developers are working on new software applications and hardware add-ons

**Technology Trailblazer**

**Donna Dubinsky**
- President and CEO of 3Com’s Palm Computing Division
- Founded Handspring with Jeff Hawkins in 1998 with the goal of becoming the leading handheld computing device maker for the consumer market
- The most-rapidly adopted new computing product ever manufactured
What is a digital camera?
- Allows you to take pictures and store the photographed images digitally.
- Images are viewable immediately on the camera.
- You can download, or transfer a copy of the pictures from the camera to the computer.
- Images can be edited, printed, or posted on a Web site or photo community.

How are digital camera images stored?
- Generally, the more expensive cameras use higher-capacity storage devices, which means they can hold more pictures.

How does a digital camera work?
1. Point to the image to photograph.
2. Light passes into the lens of the camera.
3. The CCD generates an analog signal that represents the image.
4. The analog signal is converted to a digital signal by an analog-to-digital converter (ADC).
5. A digital signal processor (DSP) adjusts the quality of the image and stores the digital image on storage media in the camera.
6. Images are transferred to a computer by plugging one end of the cable into the camera and the other cable end into the computer; or the images are copied to the hard disk directly from the media.
7. Images are viewed on the screen, incorporated into documents, or printed.

What are three basic types of digital cameras?
- **Field camera**: A portable camera that has many lenses and other attachments.
- **Point-and-shoot camera**: Provides acceptable quality photographic images for the home or small business user.
- **Studio camera**: A stationary camera used for professional studio work.

What is resolution?
- The sharpness and clearness of an image.
- The higher the resolution, the better the image quality, but the more expensive the camera.
- A pixel (picture element) is a single point in an electronic image.
- In digital images, the pixel is a tiny square.
- The greater the number of pixels, the better the quality of the image.

What are measurements of resolution?
- **megapixel**: 1 million pixels
- **dots per inch (dpi)**
- **bits per dot**
- **optical resolution**: The actual photographed resolution.
- **enhanced resolution**: Also called interpolated resolution.

Use a special formula to add pixels between those generated by the optical resolution.
**What is video input?**

- The process of entering a full-motion recording into a computer and storing it on a storage medium.
- Also called video capture.
- A video capture card is an expansion card that converts the analog video signal into a digital signal that a computer can understand.
- A digital video (DV) camera is a video camera that records video as digital signals.

**What are some factors related to video input?**

- Video files can require huge amounts of storage space.
- Video compression is used to decrease the size of the files.
- Files can be compressed using software or hardware.

**What is a PC video camera?**

- A DV camera that allows the home user to record, edit, and capture video and still images and to make video telephone calls on the Internet.
- Also called a PC camera.

**How can you use a PC video camera?**

- Video telephone call:
  - Both parties see each other as they talk.
  - To provide security in your home:
    - The PC camera can be set to take digital photographs at preset time intervals.
  - A digital watermark:
    - A small digital image that when held in front of a PC camera, displays an associated Web page on the computer screen.

**What is a Web cam?**

- A video camera whose output displays on a Web page.
- Also called a cam.
- Some display still pictures and update the displayed images at a specified time or time intervals.
- A streaming cam shows moving images by sending a continual stream of pictures.

**What is videoconferencing?**

- A meeting between two or more geographically separated people who use a network on the Internet to transmit audio and video data.
- Requires videoconferencing software, microphone, speakers, and a video camera attached to your computer.
- A whiteboard is another window on the screen that can display notes and drawings simultaneously on all participants' screens.
What is a scanner?
- A device that captures data directly from source documents
- A source document is the original form of the data

What is an optical scanner?
- Usually called a scanner
- A light-sensing input device that reads printed text and graphics and then translates the results into a form the computer can use
- A flatbed scanner, a more popular type, works similarly to a copy machine except it creates a file of the document in memory instead of a paper copy

How does a flatbed scanner work?
1. The document to be scanned is placed face down on the glass window.
2. A bright light moves underneath the scanned document.
3. An image of the document is reflected into a series of mirrors.
4. The light is converted to an analog electrical current that is converted to a digital signal by an analog-to-digital converter (ADC).
5. The digital information is sent to memory in the computer to be used by illustration, desktop publishing, or other software; or it is stored on disk.
6. You can print the image, e-mail it, include it in a document, or place it on a Web page.

What are various types of scanners?
- Pen or handheld
- Drum
- Sheet-fed
- Flatbed

What is image processing?
- Also called imaging
- Consists of capturing, storing, analyzing, displaying, printing, and manipulating images
- Allows you to convert paper documents into an electronic form
- An image processing system is similar to an electronic filing cabinet that provides access to exact reproductions of the original document

What is an optical reader?
- 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)
- Optical mark recognition
- Bar code scanner
What is optical character recognition (OCR)?

- A technology that involves reading typewritten, computer-printed, or handwritten characters from ordinary documents and translating the images into a form that the computer can understand.

Software

- Works with an optical scanner to convert a scanned image into a text file that can be edited.

OCR device

- Includes a small optical scanner for reading characters and sophisticated software for analyzing what is read.

What is an OCR font?

- An OCR font, such as OCR-A, is used with OCR devices.
- An OCR device determines the shapes of characters by detecting patterns of light and dark.
- OCR software converts the shapes into characters the computer can understand.

What is a turnaround document?

- Many companies use OCR characters on turnaround documents.
- A turnaround document is one that you return to the company that creates and sends it.

What is optical mark recognition (OMR)?

- Reads hand-drawn marks such as small circles or rectangles.
- A person places these marks on a form, such as a test, survey, or questionnaire answer sheet.

What is a bar code scanner?

- Uses laser beams to read bar codes.

What is a bar code?

- An identification code that consists of a set of vertical lines and spaces of different widths.
- Represents data that identifies the manufacturer and the item.
- The scanner reads a bar code by using light patterns that pass through the bar code lines.

Number system

- Character identifies type of product.

Manufacturer identification number (Kellogg’s, in this case)

Check character verifies accuracy of scanned UPC symbol.

Item number (10 oz. Box of Froot Loops)
What are some widely used types of bar codes?

- **Codabar**
- **Code 39**
- **Nonretail applications such as manufacturing, inventory, military, and health applications requiring numbers and letters in the bar code**
- **EAN – European Article Numbering**
- **Similar to UPC, except used in Europe. A variation of EAN is used for ISBN numbers on books**
- **Interleaved 2 of 5**
- **Nonretail applications, such as game tickets, requiring only numbers in the bar code**
- **POSTNET – Postal Numeric Encoding Technique**
- **U.S. Postal Service to represent a postal code or delivery point code**
- **UPC – Universal Product Code**
- **Magazines and books to display a Web page**

**Web bar code**

### Scanners and Reading Devices

**What is a magnetic ink character recognition reader (MICR)?**

- Can read text printed with magnetized ink
- The banking industry almost exclusively uses MICR for check processing

### Input Devices for Physically Challenged Users

**What is wireless input?**

- A handheld computer or device is used to collect data wirelessly at the location where the transaction or event takes place
- Later the data is transferred to a desktop computer through a docking station

**Input Devices for Physically Challenged Users**

**What is a keyguard?**

- A metal or plastic plate placed over the keyboard
- Allows users to rest their hands on the keyboard without accidentally pressing any keys
- Also guides a finger or pointing device so a user presses only one key at a time
- For users with limited hand mobility

**Input Devices for Physically Challenged Users**

**What is an on-screen keyboard?**

- A graphic of a standard keyboard that displays on the user’s screen
- A pointing device is used to press the keys
Input Devices for Physically Challenged Users

What options are available for users with motor disabilities?

- A handheld switch can be used as a pointing device
- A portable computer or pointing device can be mounted to a wheelchair
- People with limited hand movement can use a head-mounted pointer

What are new developments in computing that will benefit physically challenged users?

- Developments now in the prototype stage attempt to provide users with a natural computer interface
- Gesture recognition
  - Computer will be able to detect human motions
  - Computers with this capabilities have the potential to recognize sign language, read lips, track facial movements, or follow eye gazes
- Implantation
  - For paralyzed or speech impaired individuals
  - A doctor will implant a computerized device containing a transmitter into the brain
  - As the users thinks, the transmitter will send signals to the computer

PUTTING IT ALL TOGETHER

What type of input devices do users require?

- Large Business
  - Enhanced keyboard or ergonomic keyboard
  - Mouse
  - Touch screen
  - Light pen for point-of-sale terminals
  - 42-bit 1,200x1,200 dpi color scanner
  - OCR or OMR or bar code reader or MICR reader
  - Microphone
  - Voice recognition software
  - PC video camera

- Home
  - Enhanced keyboard or ergonomic keyboard
  - Mouse
  - Joystick or wheel
  - 30-bit 600x1,200 dpi color scanner
  - 1-or 2-megapixel digital camera
  - Microphone
  - Voice recognition software
  - PC video camera

- Power
  - Enhanced keyboard or ergonomic keyboard
  - Mouse
  - Stylus and portable keyboard for handheld computer
  - 36-bit 600x1,200 dpi color scanner
  - 1-or 2-megapixel digital camera
  - Microphone
  - Voice recognition software
  - PC video camera

- Mobile
  - Wireless mouse for notebook computer
  - Trackball, touchpad, or pointing stick on notebook computer
  - Stylus and portable keyboard for handheld computer
  - 2-or 3-megapixel digital camera
  - Voice recognition software
  - PC video camera

Summary of Input

- What is input?
- What are input devices?
- The keyboard
- Pointing devices
- Mouse
- Other pointing devices
- Voice input
- Input devices for handheld computers
- Digital cameras
- Video input
- Scanners and reading devices
- Input devices for physically challenged users

Chapter 5 Complete