Module 1.2 Input and output

Written module activity

Input

Scanners and cameras

1. Name two input devices which can be used to input images into the computer.

1. Scanner and digital camera

2. What would you say are the three main advantages of digital cameras, other than any cost-related issues?

2. They allow one you to take hundreds or thousands of photos (depending on the size of your memory card).
   You can see the images immediately (and delete those you don’t want).
   You can easily transfer the images you want to edit to a computer because they are already in digital format

3. Explain what a pixel is and its relationship to the quality and physical size of a digital image.

3. Pixels form the basis of a digital image and are the small dot-like elements that make up the image. The more pixels that are used to form the image, the better the quality of the image and the more space it will physically take to store the image and vice versa.

4. Describe one way in which you could transfer photographs from your digital camera to your laptop computer without making use of a USB cable.

4. You can take out the memory card and insert it into the laptop either directly (if it has slot for it) or by using a card reader device connected to the laptop, or you can transfer them wirelessly.

5. An advert for a digital camera listed these specifications: 15 MP and ISO 6400.
   Explain the significance of these two specifications and what they represent.

5. The MP specification means that the camera can take images with a maximum resolution of 15 megapixels, i.e. the total number of pixels that make up the picture. The bigger this specification, the better the image quality.
   The ISO rating refers to how sensitive the camera sensor is to light, i.e. ‘how good’ the camera is at taking pictures in low light without a flash.

6. Unlike a point-and-shoot camera, a DSLR camera allows you to change lenses. What is the advantage of larger lenses?

6. They capture more light, which improves image quality and detail.
7. What is the problem with digital zoom as opposed to optical zoom on a digital camera?

Digital zoom uses lenses on the camera to ‘get closer’ to the object being photographed. Digital zoom works like the magnifying tool in software and is nothing more than zooming into an existing image – it reduces resolution and pixilates the image.

8. Your teacher has a hardcopy version of an old exam paper. He wants to edit it as some of the questions have become outdated.

a) What does the term hardcopy refer to?
   a) Text and images printed onto paper.

b) Explain how your teacher can edit the exam paper in his word processor.
   b) Scan the hard copy with a scanner as an image. Then use OCR (Optical Character Recognition) software to recognise the characters and convert the image into a document that can be edited in a word processor.

9. Your sister scanned an image she wants to use for a project but found that it is nearly 5 GB in size. Give two ways in which she can reduce the size of this stored image.

9. Reduce the resolution at which the image was scanned.
   Reduce the colour depth / scan in grayscale.
   Save in a compressed format such as jpeg.

10. Your school shop is considering introducing a bar-code system for the books and stationery they sell.

   Give two benefits a bar-coding system provides.

10. Barcode scanners are especially helpful in libraries and Point of Sale (POS) systems for speeding up the checkout process.
    Better stock control.
    Increased accuracy.

11. The main purpose of a scanner is to scan images to convert and store them in a digital format.

   Give three advantages of having data or images scanned and stored in this way.

11. Any three advantages:
    • Large documents consisting of many pages can be scanned into a single digital file.
    • The electronic copies created do not take up office space such as paper files.
    • Scanned copies can be e-mailed instead of having to be faxed.
    • Old photos and documents can be scanned and preserved and stored for future generations
    • Hard copy documents that contain typed text can be converted into an editable document, for example to a Word document format, using OCR (Optical Character Recognition) software, etc.

12. Your mother wants to scan all the old family photographs to preserve them. Give one potential drawback that she might encounter during this process.

12. Scanning can be slow and take a lot of time.

   The quality of the digital images depends on the quality of the original photographs.
13. A scanner was advertised with a specification of 24 bit colour depth. Explain what the significance of this specification is and what it represents.

13. Colour depth refers to the number of different colours that can be represented by a pixel. The higher the number, the greater the number of colours that can be represented and the larger the resulting image file will be.

14. What is the main advantage in terms of supplying a URL in a QR code?

14. QR codes provide a quick way to let people connect to your website without having to type in (or remember) a web address.

**Biometric input**

15. Your mother wants to buy a new flash disk. She saw an advert for a Biometric flash disk. She asked if ‘Biometric’ is the manufacturer of the flash disk.
   a) Briefly explain what biometric means in this context.
      a) Biometric input involves capturing unique biological features of a person for identification purposes.
   b) What is the main benefit of a biometric flash drive?
      b) Only the user can access the contents of the flash drive (via their fingerprint).

16. Why is it so difficult to defeat (bypass) biometric security?

16. It is uniquely linked to a single person and cannot be shared like passwords.

17. List three types of biometric measurements or inputs besides fingerprints.

17. Iris scans, voice matching, recognising you from the way you walk, and facial recognition.

18. What are the two main disadvantages or limitations of using biometric security?

18. It is expensive to implement and maintain and it needs additional hardware and software (if not already included in the device).

**Input at ATMs**

19. Why does an ATM need a modem or network connection?

19. To be able to communicate with your bank.

20. Give two ways in which ATMs get their input from users.

20. Keypad (numeric or on-screen), touch screen and menu choice buttons.

21. Which two devices do ATM thieves often install on or near an ATM in order to steal banking data?

21. Skimmer, video camera
Input into POS systems

22. RFID tags are often attached to articles of clothing in clothing stores. The tags are then removed or deactivated by the shop assistant when you pay for the item at the till.
   a) Briefly explain what a RFID tag is.
   a) RFID tags store data on the tag or card which can be detected wirelessly, in order to automatically ‘recognise’ a product or item.
   b) What is the benefit to the store of having these tags attached to the clothing?
   b) The items do not have to be physically passed through/over a scanner as the contents of the tags are read wirelessly.
   c) If you pay for an article by tapping your phone on a payment sensor at the till point, what technology would you be using? Also give an advantage of using this technology.
   c) Near Field Communication (NFC) which allows you to simply swipe your phone (or smartwatch) over a payment point to complete a payment without using a credit card or typing in a PIN.

23. A Point of Sale (POS) system is great for both the customer and the business. Give three of its advantages.

   23. This system works much faster than typing in prices on a keyboard.
   Prices can be updated and entered with greater accuracy.
   From the business side, they can record exactly how many items are being sold and track how much stock they have left in real-time.

Touch screens (as input devices)

24. Is a touch screen an example of an input or an output device? Motivate your answer.

24. It is in fact an input and output device, as input can be done via gestures and output can be displayed on the screen.

25. Give three advantages of using a touch screen over other forms of input.

25. A touch screen allows more screen space in a device, as no space is needed for a keyboard.
   There is a type of ‘intimacy’ and ‘immediacy’ in directly touching the data or controlling components.
   It is intuitive to use – very little training needed.
   It allows input such as drawing and gestures.

26. Give two potential disadvantages of using a touch screen over other forms of input.

26. Typing on an on-screen keyboard is not as fast or easy as typing on a physical keyboard.
   A touch screen can become dirty, oily and smudged, especially if used with dirty fingers.
Data collection devices

27. Many dedicated devices have built-in circuitry and sensors to gather data that computers can process. Examples include meter readers to capture water and electricity consumption readings in households.

a) Give two other situations where these devices can be used to automatically record data.

   a) Activity trackers such as Fitbit
   Remote diabetes monitors
   To monitor a patient’s temperature, heart rate and blood pressure in a hospital or even remotely
   Weather buoys, which float in the ocean to collect and record temperature, wind and other weather conditions
   To monitor temperature, pressure and humidity levels in environments that need to be carefully monitored and controlled, e.g. in research laboratories and nuclear power stations

b) Give two advantages of using these types of devices with sensors to automatically gather data.

   b) Data is captured automatically using sensors, even in remote areas, without human intervention.
      Data is captured more accurately than by using human input.
      Data is captured faster than by using human input.

c) Give two possible disadvantages of using sensors to automatically gather data.

   c) Sensors can fail without the problem being detected, resulting in incorrect data.
      Only sensor-detectable data can be collected.
      Owing to their often inaccessible location, these devices can be difficult and expensive to update, expand the scope of, repair or replace.

Input into smartphones and consumer tablets

28. What else can the microphone on a smartphone be used for besides phone calls?

   28. They can also be used for voice memos and for the sound when recording video.
       The user can also use it to dictate text or to give commands to control the smartphone.

29. What are accelerometers and what are they used for in smartphones?

   29. They are sensors that are used to detect which way around the smartphone is being held or how it is being moved. It also allows the use of movement to control programs (so, for example, you can ‘drive’ a car in a game by turning the device).

30. What is Siri?

   30. Siri is digital voice assistant used on Apple devices.
Alternative keyboards

31. What is meant by the term ‘virtual keyboard’?

31. Devices like smartphones and tablets often don’t have a keyboard. Instead they create ‘virtual keyboards’ by popping up an image of a keyboard on the screen. You then type on the screen by touching the ‘keys’ displayed.

Output

32. Give two examples of ‘touch output’ devices.

32. Joysticks, game controllers, smartphones

33. Give two ways of connecting a printer to a computer.

33. USB cable, wirelessly (Bluetooth, WiFi etc.), Ethernet (network) port

Display devices

34. Give one additional type of input device, and one additional type of output device, that some monitors are provided with.

34. Input: webcam; Output: speakers

35. If you see 1920 x 1440 in an advert for a monitor, what does this mean?

35. The monitor has a resolution of 1920 x 1440 (measured in pixels, horizontally and vertically)

36. Which kind of user should pay particular attention to the response time of a display?

36. Gamer

37. Display A has slightly faded images and Display B has clear crisp images with deep dark blacks and bright whites. What specification is likely the cause of this difference between the two displays?

37. Contrast ratio

38. A monitor was advertised as an HDMI monitor. Briefly explain what HDMI refers to and give one benefit it provides.

38. HDMI is an interface, or port, used to connect a monitor to a computer. It transmits high-definition video and sound via a single cable.

39. Take a look at the table of display devices below:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>40&quot;</td>
<td>16:10</td>
<td>10 ms</td>
<td>1280 x 1024</td>
</tr>
<tr>
<td></td>
<td>27&quot;</td>
<td>16:9</td>
<td>8 ms</td>
<td>2560 x 1440</td>
</tr>
<tr>
<td></td>
<td>17&quot;</td>
<td>4:3</td>
<td>2 ms</td>
<td>1600 x 1200</td>
</tr>
<tr>
<td></td>
<td>21&quot;</td>
<td>16:9</td>
<td>10 ms</td>
<td>1920 x 120</td>
</tr>
</tbody>
</table>

Write down what each of the categories or specifications A – D stands for, and what their significance is.
39. A Size of screen: measured diagonally in inches  
   B Aspect ratio: ratio between the width and the height of the screen  
   C Response time: how quickly the monitor updates its pixels (usually measured in milliseconds)  
   D Resolution: the maximum number of horizontal and vertical pixels that a screen can display. The higher the resolution, the more you can fit on your screen, but your text and images become smaller.

40. Give three general limitations or potential disadvantages of monitors in terms of using them on an everyday basis.

   Output is not permanent.  
   Output is difficult to share.  
   Usage can lead to eyestrain and headaches.  
   Work is not private (visible to any passer-by).  
   It is the single component that consumes the most electricity (battery power in portable devices).  
   They can be difficult to read in very bright light.

41. Give one reason why or a circumstance where you would purchase the biggest monitor for your computer.

   When it would benefit your general usage of the computer – for graphics design, architectural drawings, gaming, etc.  
   If you suffer from poor eyesight.

42. Explain why the same monitor when connected to different computers has a different maximum resolution.

   A monitor’s maximum resolution depends on the video card you are using.

43. Your school wants to buy a data projector. The model they have in mind is rated at ‘2000 lumens’.

   Explain what the lumens specification is and why it is so important.

43. Lumens is a measure of the brightness of the image a data projector can project. The higher the lumen rating, the more effective the projector will be – especially when trying to project very large images or when trying to project an image in a normally lit classroom (i.e. without closing curtains or dimming the lights).

Printers: Laser printers and inkjet printers, 3D Printers

44. In what unit is the resolution of a printer measured? Also explain how the resolution is measured, and what the relationship is between a printer’s resolution and the quality of the printed output.

   The resolution which is measured in dpi (dots per inch) and is specified in a similar fashion to a monitor (horizontal and vertical), e.g. 1200 X 600 dpi. The higher the dpi, the better the quality of the printed output, which is very important when printing pictures.
45. Your mother purchased an inkjet printer.
   a) She complained that the printer prints far slower than its 12 ppm specification suggests. Explain to her why this might occur (assuming no hardware or software problems).
   a) Print speeds are given for printing a page of text. Adding images slows a printer down – and inkjets will slow down far more than laser printers will.
   b) One of the other specifications she noted was: A4, A5, A6, B5, C6 Letter, Legal. What do these refer to?
   b) These refer to the different paper sizes the printer can use/print on.
   c) Another specification referred to ‘2000 pages per month’. Give the common term or name given to this specification and explain what the significance of this specification is.
   c) It is the (monthly) duty cycle. This is a rough estimate of how many pages you should print on your printer per month to avoid undue wear and tear on the printer.

46. Give two ‘products’ that could be created by a 3D printer for use in the medical industry.

46. Human body parts and working prosthetics (e.g. bones, joints, artificial hands and legs), devices such as pacemakers and specialised sensors, etc.

**Interactive whiteboards**

47. Your school is considering purchasing some interactive whiteboards.
   a) Give three advantages of using an interactive whiteboard to teach.
   a) The person using it can manipulate the computer functions on the board.
      It allows for better interaction and participation to enhance the process of teaching and learning.
      Notes made on the board during the lesson can be saved and accessed from the computer for the next lesson, or a copy given to learners.
      Presenting content in multimedia format assists learners who learn better from visual examples than by hearing (spoken word).
   b) Give two potential disadvantages of using an interactive whiteboard to teach besides any issues related to the cost or venues used.
   b) The system is only as good as the quality (and availability) of suitable software.
      Teachers are sometimes hesitant or fearful of using new technology and require training.

48. WiFi and Bluetooth technologies are used to increase the usefulness of output devices.
   a) What are the advantages of using these technologies for printing in a network?
   a) Printers with wireless capability can print wirelessly, and so can be placed anywhere within range and set to join your wireless network. Then any computing device connected to the network can print to the printer (without the need for a physical connection).
b) Explain how Bluetooth technology can be used with entertainment systems in a car.

b) Bluetooth technology can be used for stereo headphones for passengers, speaker systems and car audio systems to allow mobile devices to play better quality sound than their small internal speakers allow.

What makes it all work?

49. A friend wants to upgrade his operating system to the latest version. He was advised against it as someone said that the new operating system will not have a driver for his older printer.

a) Briefly explain what a driver is.

a) A driver is software that allows your computer (operating system) to communicate with hardware or devices and control them.

b) Explain why not having a driver for the old printer is a problem.

b) Without an updated driver, the computer may not be able to use the printer or use all its functions correctly.

c) Where would be the best place for the friend to try to find an updated driver for his older printer?

c) The manufacturer’s website or by searching on the internet.

50. When you plugged your smartphone into your computer, you saw a message stating ‘Device detected ... Device has been installed’.

a) Give the general name given to this process and briefly explain what happens during this process.

a) Plug-and-play. It refers to a series of technologies where the operating system automatically detects that a new device has been added to the computer and configures the device so that the device can be used almost immediately.

b) During this process you were not asked to install a driver. Does this mean a driver was not needed? Explain your answer.

b) No, you will only be asked for a driver if the operating system does not have a suitable driver. In such a case, it will ask you to install it (this usually only happens once, when you connect the device for the first time).

Input and output for physically challenged users

51. Braille keyboards, displays and printers are commonly used by visually-impaired or blind users.

What is Braille?

51. Braille consists of a ‘code’ of bumps on a surface, which can be read by feeling them with your fingers.
52. Your Granny has bad arthritis and struggles to type accurately and to use the mouse. Give two pieces of hardware that could make life much easier for her.

52. Eye tracking and head movement devices
   - Large-key keyboards
   - Large trackballs
   - Joysticks
   - Foot pedal control devices
   - Sip and puff devices

Input and output and health issues

53. Give two reasons why you should learn to use keyboard shortcuts.

53. So that you don’t have to move between mouse and keyboard so frequently / To work more efficiently.

   Many keyboard shortcuts are the same across different programs, e.g. Ctrl+S for saving.

54. Give three tips on different ways to manage your work style that will help to minimise the negative impact that the prolonged use of input and output devices may have on your health.

54. Do not sit for hours on end – get up and move around every hour or so.

   Do not stare fixedly at the monitor for long stretches – glance every so often at other objects in the room, or out the window.

   Learn keyboard shortcuts so that you don’t have to move between mouse and keyboard so frequently.

   Do appropriate exercises to relieve the tension in affected joints (wrist, neck, etc.).

   Do not turn up the volume of your headphones to drown out surrounding sound.

   Adjust the monitor settings so that it doesn’t hurt your eyes, and place it so that there are no glaring reflections.