COMPUTER STUDIES NOTES

INPUT DEVICES continued …

Scanning Devices

These are devices that capture data directly into the computer.

They can also be defined as devices that use a magnetic or photo-electric source to scan and convert

images into electric signals that can be processed by an electronic apparatus, such as a computer.

Uses of Scanning Devices

Scanning devices are commonly used to:

1. Convert a text document into an electronic file;

2. Convert a photograph into an electronic graphic file;

3. Sense an image to be sent over a voice frequency

4. Circuit, such as a fax machine;

5. Reproduce text and images, as with a copier.

Classification of scanning devices

Scanners are classified according to technology used to capture data namely: optical and magnetic

scanners.

Optical scanners

These scanners capture data using optical or light technology.

Examples of optical scanners

Optical mark recognition (OMR)

Fig: OMR Machine

They capture inked marks on paper by passing infrared light over them, the documents are pre-printed with predefined data positions. These positions can then be marked by a pencil or anything similar. A device called an optical mark reader converts the marks into computer-readable data. The reader detects the presence or absence of a mark on a form by sensing reflected infrared light.

Uses of OMR

1. They are used to mark multiple choice questions
2. Insurance premium collection
3. Supermarkets for stock recording
4. Traffic surveys
5. Voters 'registration process

Advantages of OMR

1. Fewer mistakes are made by machines reading marks than are made when reading hand written characters.
2. Data can be prepared without any special equipment
3. Data can be prepared where it is collected

Disadvantages of OMR

1. It is difficult for the computer to check marked data
2. Documents may be difficult to understand and fill in or impractical to design
3. The person putting the marks on the document has to follow the instructions precisely
4. The document reader has to be reprogrammed for each new document design.

Optical bar recognition (OBR)

This is an electronic equipment that scans, interprets, and converts bar coded information into a machine readable form. A barcode scanner captures the black and white elements of a barcode by illuminating the code with a red light, which is then converted into matching text. More specifically, the sensor in the barcode scanner detects the reflected light from the illumination system (the red light)

and generates an analog signal that is sent to the decoder. The decoder interprets that signal, validates the barcode using the check digit, and coverts it into text.

The first six numbers of the barcode is the manufacturer's identification number. The next five digits represent the item's number. The last number is called a check digit which enables the scanner to determine if the barcode was scanned correctly or not.

They are mostly used in supermarkets for transactions in a point of sale terminal (POS), Libraries to capture book details, colleges to validate exam cards etc.

Advantages of OBR

1. Reduces the amount of training time for employees
2. The amount of errors made in a computer system by items with a barcode is significantly less than those made by human error.
3. They are cost effective
4. They are fast in transactions
5. Promotes better decision making
6. Control of inventory records improves

Disadvantages of OBR

1. They are expensive to maintain and acquire
2. When they breakdown, they can cause a lot of inconveniences. Because users can revert to manual if help does not arrive soon.

Optical character recognition (OCR)

OCR converts handwritten, typewritten and printed text and images into machine readable form. An OCR reader can recognise characters from their shape. The interception of the characters relies on the sophisticated OCR software in the computer. They can be used to scan stocktaking sheets, sales order forms, documents can be input into another system such as signatures. They are used at schools, libraries, banks etc. to scan photos, receipts and other documents.

Advantages of OCR

1. No typing is required, therefore not prone to transcription errors
2. Saves stationery
3. Provides faster input as compared to typing
4. The documents don't have to be designed to be used

Disadvantages of OCR

1. It's expensive to acquire
2. These scanners are limited to document size.
3. Sometimes they fail to recognise other characters due to their formation
4. Special handling skills and precautions are necessary for effective usage.

Magnetic Scanners

These scanners use magnetic technology to capture handwritten and magnetic strip data. Examples include:-

MICR – Magnetic Ink Character Recognition

MICR recognizes characters made of magnetic ink. The characters are printed using an ink containing Iron II Oxide that gives them magnetic property. As the document passes into the reader, the ink is magnetized and the characters are recognized by the strength of magnetism. The magnetized characters cause the current to flow through the read head depending on the magnetized surface area occupied by individual characters. The different characters are discriminated depending on the magnetic pattern that induces the different amount of currents. The MICR recognizes these patterns and conveys them to go as computer input in terms of electrical signals.

The MICR is most commonly used in banks to read Cheques which are encoded with the Cheque number, branch number of the bank and the customer's account number.

MICR
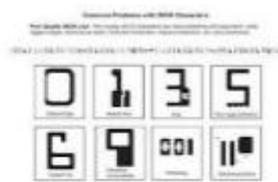
Inked characters

Advantages of MICR

1. MICR is difficult to forge

2. The document can still be read when folded, written on etc.

Disadvantages of MICR

1. They are expensive

2. The system can only accept a few different characters

Digitizers

Digitizer is also known as a graphic tablet, allows a user to draw an image using a stylus. They are

used in companies and insurance companies to verify signatures

DIGITIZER

Video digitizers consist of special hardware and software which converts video signals frame by frame

into a digital representation in computer memory which can be saved in disk if necessary. A sequence

of frames can have graphics, cartoons, text added, etc.

Digital camera

Also known as a digicam. It is a camera that takes video or still photographs by recording images on

an electronic image sensor the recording is then transferred into the computer for editing.

DIGITAL CAMERA

Touch screen

This is an electronic visual display that can detect the presence and location of a touch within the

display area. Data can be entered into a computer just by touching it with a finger.

Touch screens are used in places where keyboards would be prone to damage due to the environment or there is little space on the keyboard.

Advantages of Touch Screens

1. No extra peripherals are needed except the monitor

2. Useful for portable devices to avoid carrying the keyboard and mouse

TOUCH SCREEN

Voice input

They are also known as *speech recognition* (SR). This is the translation of spoken words into text. A user must train the system to recognise his/her voice by repeating each word in the vocabulary several times. Speech recognition devices are used in security and access control. This approach can be used in:

1. Electronic funds transfer

2. House/car security using voice activated codes

3. Office securities for room access

4. Voice activated toys and games

5. Quality control and automation in factories i.e. ordering robots

6. Automated materials handling i.e. in airports

7. Computer aided designs

Voice input devices are also used in production of music and podcasts

Limitations of using voice input devices

1. Homophones – some

2. Word separation

3. Recognition is slow

4. Speed variability i.e. the speed, pitch, range, rhythm, intonation (accuracy of pitch), loudness and pronunciation of an individual speaker can vary.

SPEECH RECOGNITION

An interactive whiteboard (IWB)

This is a large interactive display that connects to a computer and projector. A projector projects the computer's desktop onto the board's surface where users control the computer using a pen, finger, stylus, or other device. The board is typically mounted to a wall or floor stand. they are used in a variety of settings, including classrooms at all levels of education, in corporate board rooms and work groups, in training rooms for professional sports coaching, in broadcasting studios and others.
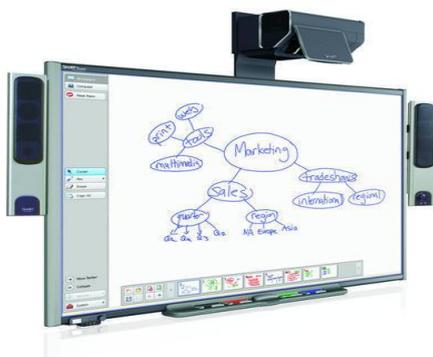
INTERACTIVE WHITEBOARD

Direct input from instruments

Sensors are devices that can be linked to computers and are used to record physical quantities like temperature, light, humidity, etc. examples of direct input instruments are:

1. Sensors to record temperature, light, humidity in a greenhouse to ensure the best conditions for plant growth.

2. Thermostats connected to a computer-controlled central heating system to monitor temperature and help to save electricity.

3. Pressure pads on a road connected to computer controlled traffic lights to speed traffic flow.

   Notes to the teacher on practical activities

1. Expose students to the above mentioned devices and how they work either by:

   a. Showing them what is available in school

   b. Downloading technology videos from YouTube or through purchase

   c. Organizing educational field trips to:

      i. Studios

      ii. Broadcasting stations

      iii. Industries and other areas relevant to the topic.

Questions on topic

1. A _____ is a handheld device used for playing games.

2. A _____ reader and _____ are used in conjunction with point of point of sale terminals to reduce data entry.

3. A _____ is a pointing device for graphic tablet in the shape of a pen.

4. The two types of scanners are _____ and _____

5. Video digitizer converts video signals into a _____ in computer memory.

6. What type of industry relies on MICR? What do they use it for?

7. State three disadvantages of using mouse over keyboard.

8. The diagram below shows coded data that could be input into a computer

6 71860 01362 4

   a) What is the name given to the above method of input?

   b) Where would this method of input be applied?

   c) State two types of information this type of input may represent.

   d) State what hardware is used to enter the coded data into a computer and briefly describe how this hardware works.

9. What is the main advantage of using a light pen than a mouse?

10. What is the advantage of using a keyboard over voice input?

11. Write the following acronyms in full:

    a. OCR

    b. MICR

    c. OBR

    d. OMR

e. POS

12. What is the advantage of OMR over the keyboard?

13. Name two most common input devices found in a microcomputer system.

14. What is the major similarity between OCR and OMR?

15. What is a light pen and how is it used with the screen?

16. The two main tasks of input devices are to _____ and _____

17. The optical readers use _____ to sense the document content while the magnetic readers use the _____ to sense the document characters that have been written using _____

18. Banks use _____ to encode the number, branch number of the bank, and the customer's account number on the cheque.

19. Give any four input devices of a computer system.

20. What are the three types of optical readers?

21. Give any two disadvantages of using Magnetic Ink Character Recognition (MICR)

22. What is the main difference between OCR and MICR?

23. State any two similarities and two differences between a touch screen and an Interactive White Board

24. Clarify the similarities and differences between OCR and a digicam in terms of how they capture data.

25. State which convenient data capture devices are fit for the following types of people:

    a. Blind people

    b. People with hearing impairment.

    c. People without hands

Works Cited

governorsolutions.com. (2013, august 2). *ADVANTAGES & DISADVANTAGES OF BARCODE*

SCANNERS. Retrieved 02 01, 2018, from GOVERNOR BUSINESS SOLUTIONS:

http://www.governorsolutions.com/advantages-disadvantages-of-barcode-scanners/

http://www.verifiedlabel.com. (n.d.). *Top Eight Benefits of Barcodes - Verified Label*. Retrieved from

Verified.INC: http://www.verifiedlabel.com/knowledgecenter/know_barcodes.aspx

Mburu, s., & Chemwa, G. (2004). LONGHORN SECONDARY COMPUTER STUDIES FORM 1. In

s. Mburu, & G. Chemwa, *LONGHORN SECONDARY COMPUTER STUDIES FORM 1* (p.

35). Nairobi: LONGHORN PUBLISHERS.

Onunga, D. J., & Renu , S. (2003). KCSE COMPUTER STUDIES BOOK 1. In D. J. Shah, *KCSE*

COMPUTER STUDIES BOOK 1 (pp. 65-83). Nairobi: Mariwa Publishers.

TRUJILLO, P. (2014, March 25). *Barcode Scanners: How Do They Work?* Retrieved from Wasp

Buzz: http://www.waspbarcode.com/buzz/how-barcode-scanners-work/

www.barcodesinc.com. (n.d.). *Advantages of Barcodes*. Retrieved from BarcodesINC:

https://www.barcodesinc.com/articles/advantages-of-barcodes.htm