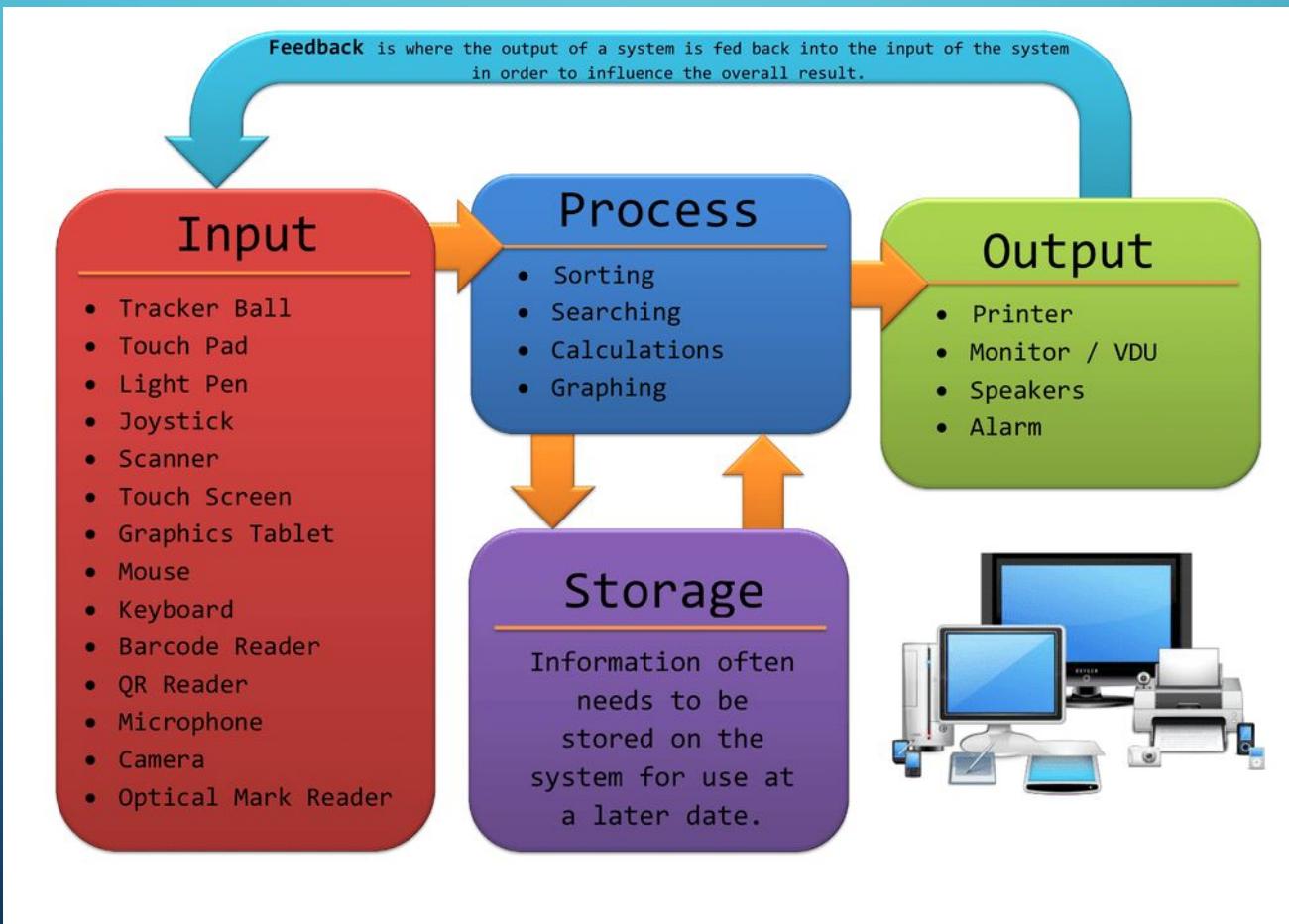


# INPUT AND OUTPUT DEVICES

# LEARNING OBJECTIVES

- Identify input devices, output devices and their uses
- Describe direct data entry and its associated devices
- Describe the advantages and disadvantages of devices

Input devices are used to put data into the computer, a processor does something with the data given by the input device, output devices are used to tell someone or something the results that the processor came up with and backing storage keeps all the data and the software that is used.

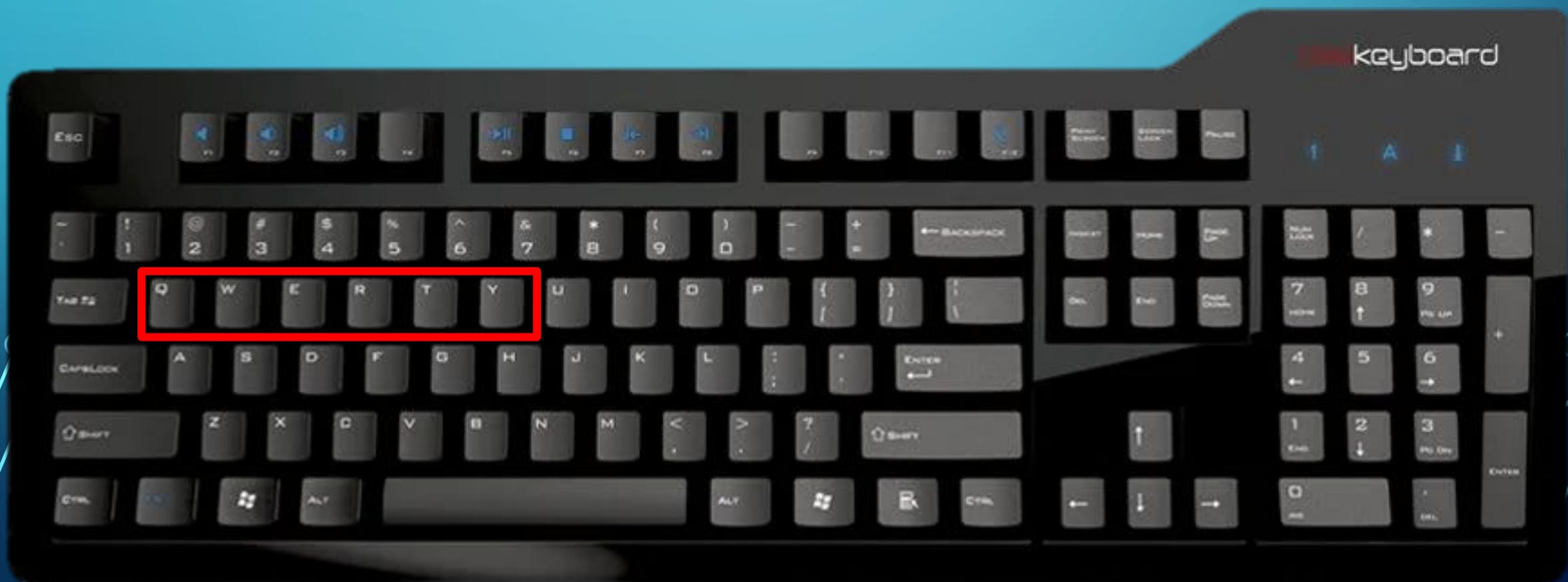


# INPUT DEVICES AND THEIR USES

- TRANSFERS DATA INTO A COMPUTER SO THAT IT CAN BE PROCESSED
- There are 2 categories of input devices:
  - Manual input devices: which are the devices used by people to enter data into a computer themselves.
  - Direct data entry (DDE) devices such as optical mark readers or a bar code reader, which enable data to be entered directly, without a human having to input it manually.

# KEYBOARDS AND KEYPADS

- Keyboards are input devices used to enter fixed values, often characters into the computer system. Types of keyboard: Qwerty, concept, numeric etc



# CONCEPT KEYBOARD

- Allow the user to decide what each of the keys should stand for and they can be changed as necessary. It looks like a flat sheet with pressure pads all over it.
- The number of different symbols can be very restricted, and this can also be a disadvantage because it makes it difficult to produce any input outside a very limited group.



# NUMERIC KEYPADS

- Most qwerty keyboards have a section on the right with a group of keys representing the digits from 0 to 9 arranged in a rectangle.
- Numeric keypads on their own are used by shoppers to input their PIN numbers when they pay for something by card. They are small, easy to use and language independent.



# POINTING DEVICES

- Mouse: this device that allows you to move the pointer on the screen and to make choices by clicking the mouse buttons.
- Advantages of using mice: They provide a fast method of input, they are intuitive to use
- Disadvantages of using mice: mice can be easily damaged or vandalized, find mice difficult to use (some people), overuse of mouse can lead to repetitive strain injury, mice need a flat surface to be moved around on.



# POINTING DEVICES

- Touchpad: A laptop computer is designed for use in places other than on a fixed surface. This means that there is often no surface for the mouse



# POINTING DEVICES

- Trackerballs: These are a little like upside-down mechanical mice. They have buttons like those on a mouse. The ball is rolled around directly by the user rather than being moved by the whole mouse being pushed.
- Advantages over mouse: is stationary and does not need a surface to be moved around on, isn't as likely to get damaged as mouse, have the freedom of movement necessary to use other (some people)
- Disadvantage: difficult to use for some applications needing fine control.



# POINTING DEVICES

- Joystick: carry out the same tasks as mouse as well as other functions such as controlling the movement of motorized wheelchair.
- As a pointing device, joystick might move a character in a game or a spaceship or a car or any other shape as a pointer.

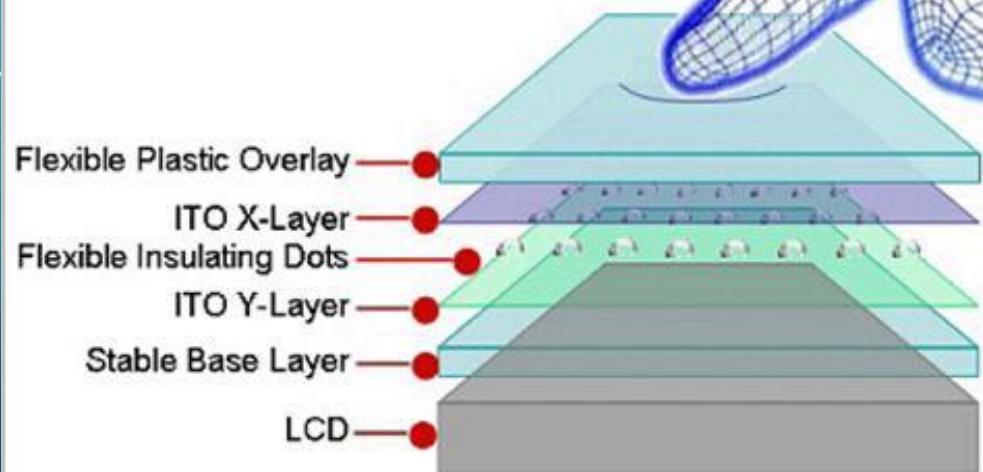


# POINTING DEVICES

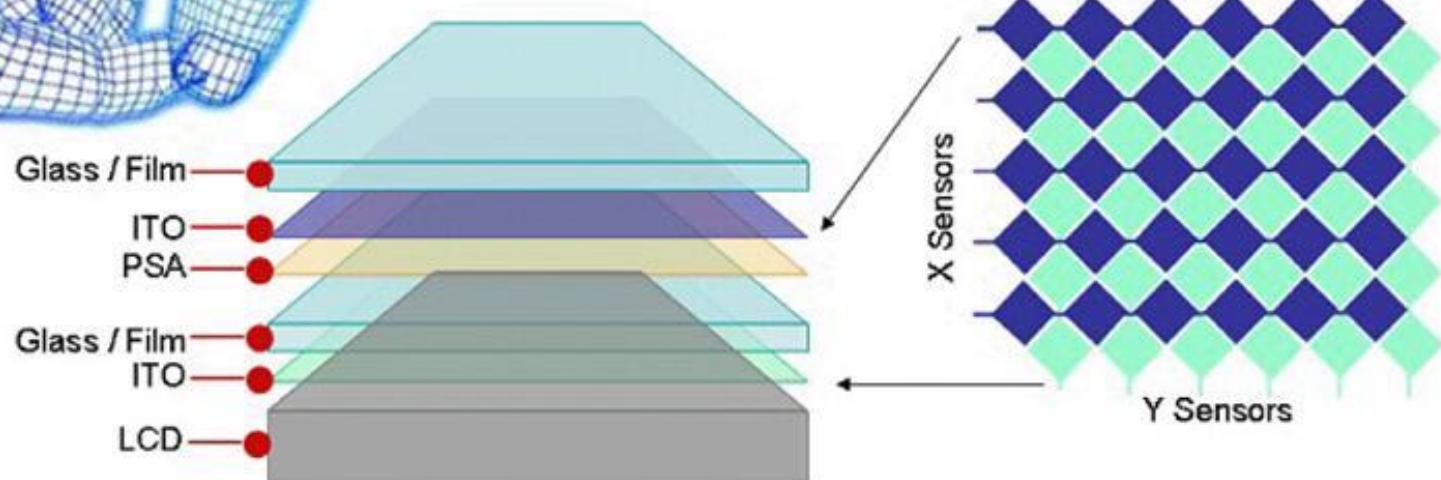
- Touch screen: can be found on personal computers, laptops, tablets and smartphones. It is display screen that is both an input and an output device.
- A touch screen can determine where on the screen the user has touched and sends that information to the processor. Two main types: Resistive (sensitive to pressure from your finger), Capacitive (screen is sensitive to your body's electric field)



## Resistive Touch Panel



## Capacitive Touch Panel



# POINTING DEVICES

- Graphics tablets: is like a very large touchpad that accepts input from its associated pen or stylus.

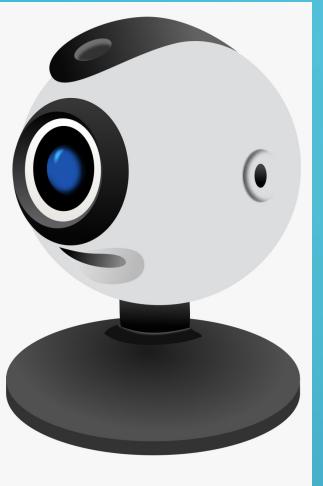


# SENSORS

- Collects data automatically by measuring some property of their environment.
- A sensor is device that collects data. A keyboard does nothing until someone presses a key, but a sensor is collecting data all the time on its own.
- There are a lot of different types of sensor, but most have something in common. They measure some physical property that can have any value.



# Webcamera, digital camera, scanner, microphone, remote control



# DIRECT DATA ENTRY AND ASSOCIATED DEVICES

- Allow data to be entered directly, without a human having to input it manually
- Used when large amounts of similar data need to be entered, often in commercial or business applications.

# OCR – OPTICAL CHARACTER RECOGNITION/READER

- Scans a typewritten document and translates the images into an electronic format that the computer can understand.
- OCR software compares the shape of each character with the shapes that it knows and, when it is matched, the computer stores the fact that it is a letter 'K' for example. This can make the input of data from hard-copy documents much quicker than retyping them. OCR software can also be used read data from passport or identified cards directly into a computer.
- A disadvantage is that the text produces is not always reliable, particularly if the hard-copy original is unclear or has smudges text.

DL9C D 5036



OCR

DL9CD5036



DRURY LANE  
By his MAJESTY's Company.  
AT the Theatre Royal in Drury Lane,  
This Day before he Play a fine write Musical  
Peculiar called Oct 3 1700  
The ELECTION.  
The principal Characters by  
Mr. VERNON,  
Mr. GAUDRY,  
And Mr. BANNISTER,  
Mrs. LOVE,  
And Mrs COLLETT.  
After which will be performed a Comedy called  
The M I S E R.  
The Miser, Mr. YATES ;  
Frederick, Mr. Brereton ; Clerimont, Mr. Farren ;  
Decoy, Mr. Wadon ; James, Mr. Burton ; Lawyer,  
Mr. Chaplin ; Upholderer, Mr. Wragg ;  
Sattin, Mr. Norris ; Jewelle, Mr. Poulson ;  
Taylor, Mr. Hocroft.  
And Kamill, Mr. PALMER.  
Mariana by Mrs. BR-RE O.V ;  
Harriet, M.s. S atp ; Mrs. wife].  
Woolley, Miss Kirk ;  
An

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Woolley, Miss Kirk ;  
Aad Lappet, Mils POPE.  
To which will be added a Pernaj.



# OMR – OPTICAL MARK RECOGNITION/READER

- Enables data marked by a human, such as surveys and tests, to be captured during a scanning process.
- A scanner can also be used to scan a sheet of paper looking for marks on the paper, such as answers to multiple-choice exam questions or even votes in an election.
- Extremely fast
- More accurate
- Dirty mark



**САНАЛЫН ХУУДАС**

Монгол Улсын Их Хурлын сонгуулийн -р тойргийн \_\_\_\_\_ дугаар хэсэг

ACX-	аймаг,	сум	ТЭМДЭГ
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Та өөрийн сонгохыг хүссэн **1** нэр дэвшигчийн нэрийн өмнөх зууван дугуйг дүүргэн будаж санаалаа тэмдэглэнз үү.

HAM 1	HAM 2	HAM 3
<input type="radio"/> Овог НЭР	<input type="radio"/> Овог НЭР	<input type="radio"/> Овог НЭР
HAM 4		HAM 5
<input type="radio"/> Овог НЭР	<input type="radio"/> Овог НЭР	<input type="radio"/> Овог НЭР

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**АЙМГИЙН ИРГЭДИЙН ТӨЛӨӨЛӨГЧДИЙН ХУРАЛ**

Та өөрийн сонгохыг хүссэн **1** нэр дэвшигчийн нэрийн өмнөх зууван дугуйг дүүргэн будаж санаалаа тэмдэглэнз үү.

HAM 1	HAM 2	HAM 3
<input type="radio"/> Овог НЭР	<input type="radio"/> Овог НЭР	<input type="radio"/> Овог НЭР
HAM 4		HAM 5
<input type="radio"/> Овог НЭР	<input type="radio"/> Овог НЭР	<input type="radio"/> Овог НЭР

SIDE - 2

- \* Ensure that you have put your signature and LTI in the allotted space on Side - 1 of the Answer Sheet, failing which you will not be awarded 'ZERO' marks.  
एहийн नाम और लिंगमध्ये में दिए गए स्थान पर अपने स्वतंत्रता तथा बाहर के लिए कोड डाक निशान करना चाहिए। ऐसा नहीं करने पर अन्धारी 'ZERO' अंक प्रदान किया जाएगा।
- \* A machine will read the coded information in the OMR Answer Sheet. In case any of the coded information is incomplete or different from the information given in the application form, the candidate will be awarded 'ZERO' marks.  
सिंचन यानी एही अंक उल्लंघन में ऑप्टिकल सुनान गया जाएगा। आवेदन यानि यह में भी कोई भौली या कोड डाक सुनान की तुलना में अट्टूरी अंक।
- \* Mark your Answer with Black/Blue Point Pen by blackening the ovals completely.  
अपना उत्तर करना / नीले कालाघाटन पेन से अवलम्बन करने को करने का बिलबाएँ।

PART - A	PART - B	PART - C	PART - D
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100	101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150	151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200	

There will be negative marking of 0.25 for each wrong Answer.  
प्रश्नके गलत उत्तर को लिए 0.25 अंक कम किये जाएं।  
ADDMENGGROUP.COM

# MICR – MAGNETIC INK CHARACTER RECOGNITION/READER

- This technology is used by banks to add data to the bottom of bank cheques so that it can be read into a computer quickly and accurately.



The ink used to print the characters has magnetic characteristics that can absorb and emit a magnetic signal. When the cheque passes through a special scanner, the part of it with the magnetic ink goes over a magnet to charge the ink before it goes on to the MICR read head.

# BAR CODE READERS

- A bar code is a set of short parallel lines in contrasting colors, often black and white. The dark lines are thick, medium or thin. If they are taken in pairs of dark and pairs of light lines they can stand for the digits 0 to 9. Barcode contains some information (country of origin number, manufacturer number, item number, check digit).



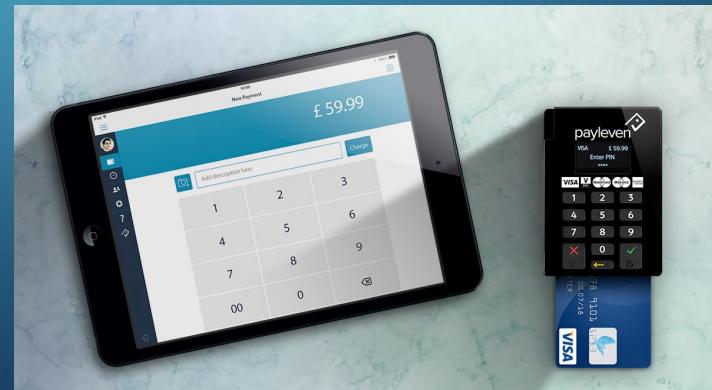
# MAGNETIC STRIPE READER

Designed to read the information stored within the magnetic stripe of special cards such as credit cards and ATM cards. The magnetic stripe is usually located on the back of the card or badge and contains the account details of the person who owns the card. This information is then verified in real time with the issuer of the card.



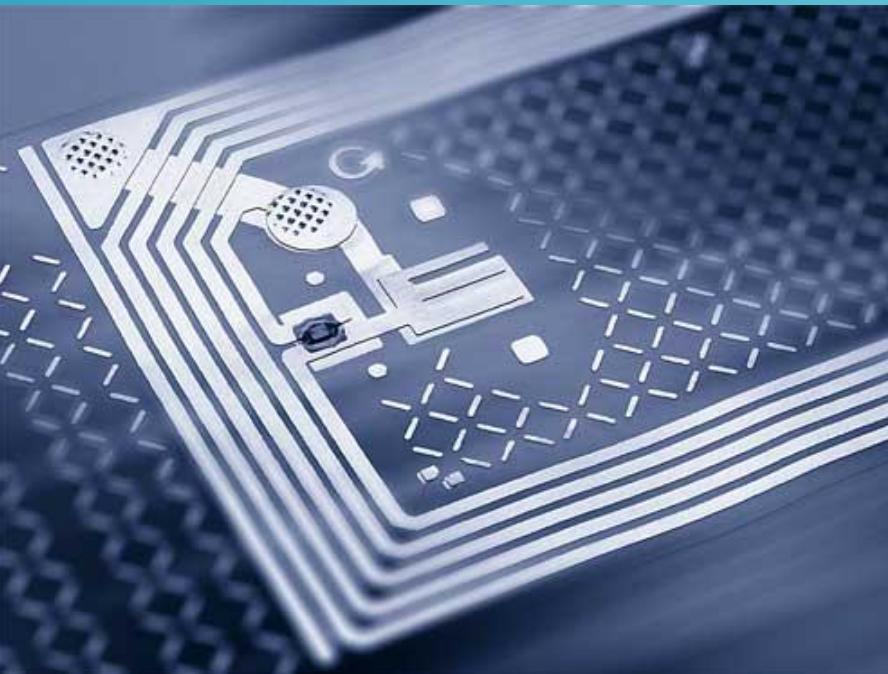
# CHIP AND PIN READER

- To make credit and debit cards more secure, they now include a small circuit with a number of computer devices all stored on a thin silver of silicon **CHIP**.
- When making a payment using a chip and PIN card, the user puts the card into an input device called a chip and PIN reader, which reads the information stored in the chip.



# RFID – RADIO FREQUENCY IDENTIFICATION

- Radio Frequency Identification (RFID) is a technology that uses radio waves to passively identify a tagged object. Its reader will typically consist of a small chip and an antenna. RFID used in conjunction with a microchip, a powered antenna, and a scanner.



# SMART CARDS AND CONTACTLESS PAYMENT

- Using debit or credit card to make payments without having the need to put the card into a reader or to enter a PIN. It uses radio-frequency identification (RFID) or near field communication for making secure payments. The embedded integrated circuit chip and antenna enable consumers to wave their card, fob, or handheld device over a reader at the point of sale terminal.



# QR CODES

- QR code is made up of a matrix of filled in dark squares on a light background.
- To make comparison, normal barcodes can hold up to 30 digits, QR codes can hold over 7000 digits.



## Advantages:

- There is no need for the user to actually write down or key in a website address, this is done automatically by scanning the QR code.
- QR codes can store website address / URLs that appear in magazines, trains, buses or even business cards, providing a very effective method of advertising.

- 1 Data can be input to a computer using direct data entry methods.

Write down the most appropriate device to input the following:

- (a) information from the chip in an electronic passport

*Radio frequency identification (RFID) reader*

[1]

- (b) text from an id card

*Optical character reader (OCR)*

[1]

- (c) account details from the front of a credit card at an EFTPOS terminal

*Chip reader*

[1]

- (d) account details from the back of a credit card at an EFTPOS terminal

*Magnetic stripe reader*

[1]

3 Data can be input into computers using direct data entry.

Tick the most appropriate method of direct data entry for each statement.

	<b>MICR (✓)</b>	<b>OMR (✓)</b>	<b>OCR (✓)</b>
Used to read magnetic data on cheques.	✓		
Used to read car number plates.			✓
Used when entering handwritten text.			✓
Used to read multiple-choice examination responses.		✓	

1 Write down the most appropriate input device which matches the following descriptions:

- (a) This is provided with a laptop to imitate the functions of a mouse.

*Touchpad*

[1]

- (b) This is not a mouse but is used to manoeuvre objects around the screen in computer video games.

*Joystick or Trackerball*

[1]

- (c) This is used to type in text.

*Keyboard*

[1]

- (d) This is used for direct input of hard copy images.

*Scanner*

[1]

1 Complete the following sentences using the most appropriate words from the list below.

hard disk drive

hardware

microphone

OCR

printer

scanner

screen

software

speaker

virus

- (a) The physical components of a computer are called.... *hardware*..... [1]
- (b) The programs and data of a computer are called.... *software*..... [1]
- (c) The device used to input sound is called a. *microphone*..... [1]
- (d) The device used to store data is called a.... *hard disk drive*..... [1]

# OUTPUT DEVICES

- **Display screens (monitors):** A monitor is a device that displays information from the computer on screen. Its main types: CRT, TFT/LCD, IPS/LCD, LCD, touch screen.
- **Multimedia projectors:** can project an image from a computer onto as large a surface. The device can be totally portable or fixed, but a disadvantage is that it relies on powerful and expensive bulb to provide the pictures. These bulbs are fragile, particularly if the projector is moved while it is still hot.
- **Speaker:** to enable you to hear sounds or music your system would need to have speakers.

# LASER PRINTER (ХУУРАЙ ХОРТОЙ)

- Printing is fast
- Toner cartridge last for long time
- Low noise is required
- Produce ozone and volatile organic compounds



# INKJET PRINTER (ШИНГЭН ХОРТОЙ)

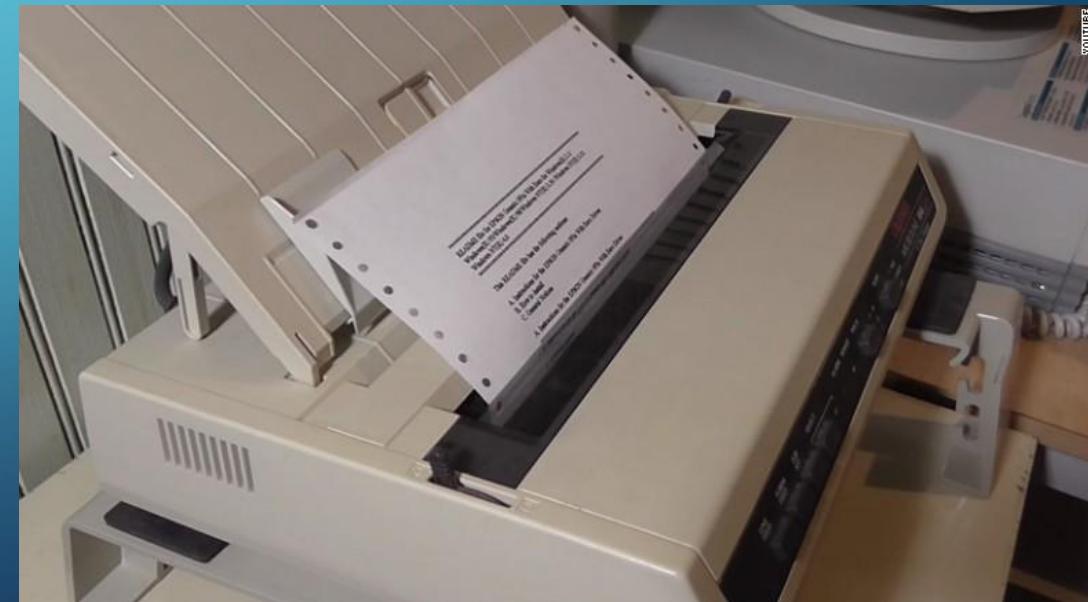
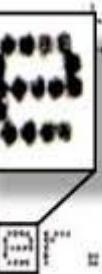
- High-quality output
- Cheaper to buy than laser printer
- Don't produce ozone and volatile organic compounds
- Slow output
- Organic ink cartridge are expensive to buy
- Can't do large print jobs because ink cartridge run out too quickly



# DOT MATRIX PRINTERS

- Very cheap to run and maintain
- Easy to use
- They can be used in noisy environments
- Environment is dusty/ dirty or moist atmospheres where near to laser or inkjet
- Cost more than an inkjet printer to buy
- Very slow, poor- quality printing

system where a i  
ld allow us t.  
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# WIDE FORMAT PRINTER

- Some offices have a use for a wide format printer, possibly to print out a huge spreadsheet. For graphic arts use they are also important in order to output layouts, posters and more. These photographs are in a wide format.

## GRAPH PLOTTER

- A plotter is an output device for printing vector graphics. A plotter uses pens to draw the vectors, giving a hard copy of the output that is sharp and clean and used to print designs of ships machines, plans for buildings, for engineering or for architecture.
- Flatbed plotter: have the paper lying flat under the pens. The pen itself is attached to a motor in a very similar way to the printhead of an inkjet printer
- Drum plotter: lies the paper on a drum that spins to drive the paper under the pen while the pen itself moves across the drum.

# GRAPH PLOTTER

- Plotters are able to work on large sheets of paper and still maintain high quality resolution.
- Plotter may print on a wide variety of materials and thus offer its user many options. Materials that a plotter can draw on include sheet steel, plywood, aluminum, plastic, cardboard and almost any flat sheet material.
- They take up more space than regular printers.

**Drum Plotter**

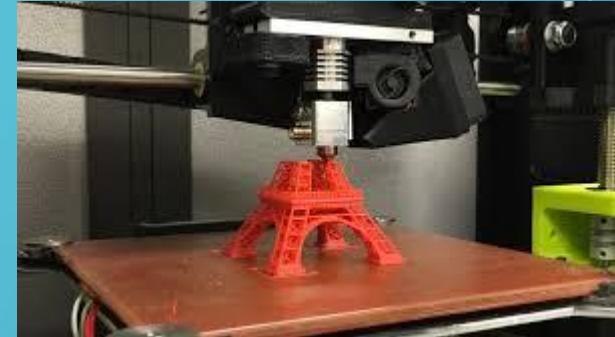


**Flatbed Plotter**



# 3D PRINTER

- The manufacturing of items has become much easier than ever before. Because 3d printers can manufacture item relatively quickly, it allows rapid prototyping.
- Even though the cost of 3d printing is very high
- Medical benefits are emerging, such as producing artificial organs, prosthetics and precision-made items for reconstructive surgery.



1 Using the list, write down the most appropriate output device to produce the following.

3D printer

dot matrix printer

graph plotter

keyboard

monitor

mouse

speaker

SSD

(a) High resolution drawings in hard copy.

*Graph plotter*

[1]

(b) Sound from a computer.

*Speaker*

[1]

(c) A solid object.

*3D printer*

[1]

(d) Scenes from a video game.

*Monitor*

[1]

# CONTROL DEVICES

- **Actuator - Take instructions from the computer and make the physical part of the process happen.**
- It is used in control applications and match up with sensors as input devices because both sensors and actuators are automatic devices which do not need any human involvement.
- Sensors collect data automatically as input. Control devices, which work in parallel with sensors. Control devices are used to change some physical value in response to command from computer. Sensors and control devices together with the controlling computer make up a control application.

These control devices are switched on and off by an actuator:

- Heaters – can be controlled by actuators. They are used in central heating systems and to ensure that greenhouses don't fall below certain preset temperature.
- Motors – If a device follows a set of specific rules, it can be controlled by a processor. Similarly if a device uses motors to carry out actions, those motors can be controlled by a processor
- Buzzers or beepers - make a single sound and are often used to inform a user that a particular thing has happened. Other devices use lights or lamps as signals to the user. If the device is controlled by a processor then the light can be considered to be an output device.

# Control devices example:

Burglar alarm - Light sensor / pressure sensor → Check → Security light / Emergency sound

Automatic greenhouses - Humidity sensor / Light → Check → Turn on/off watering / correct amount of light

Automatic light - Light sensor → Check → Turn on / off light

Oven - Time and temperature input → Check → Turn on/ off heater, buzzer ... etc

- REMEMBER: Control devices require inputs from sensors and instructions from a computer in order to produce the correct output.

Read MORE from  
<https://ictlounge.com/html/inputoutputdevices.htm>