New syllabus 2020-21

Chapter 1
Basic Computer Organisation

Computer Science

Class XI (As per CBSE Board)

A computer is an electronic device, under the control of instructions stored in its memory that can accept data (input), process the data according to specified rules(Program) on processor & produces information (output), and store the information for future use

Data vs Information

Data are raw numbers or other findings which, by themselves, are of limited value.

Information is data that has been converted into a meaningful and useful context.

Computers are being used extensively nowadays in everyday life/every field

In the form of laptop, desktop, smartphone,gadgets etc.

Advantages of computer

- Speed
- Accuracy
- Huge storage
- Versatility
- Tirelessness

Disadvantages of computer

- Data security issue
- Computer crimes
- Health risk
- Bad impact on environment if not properly disposed off
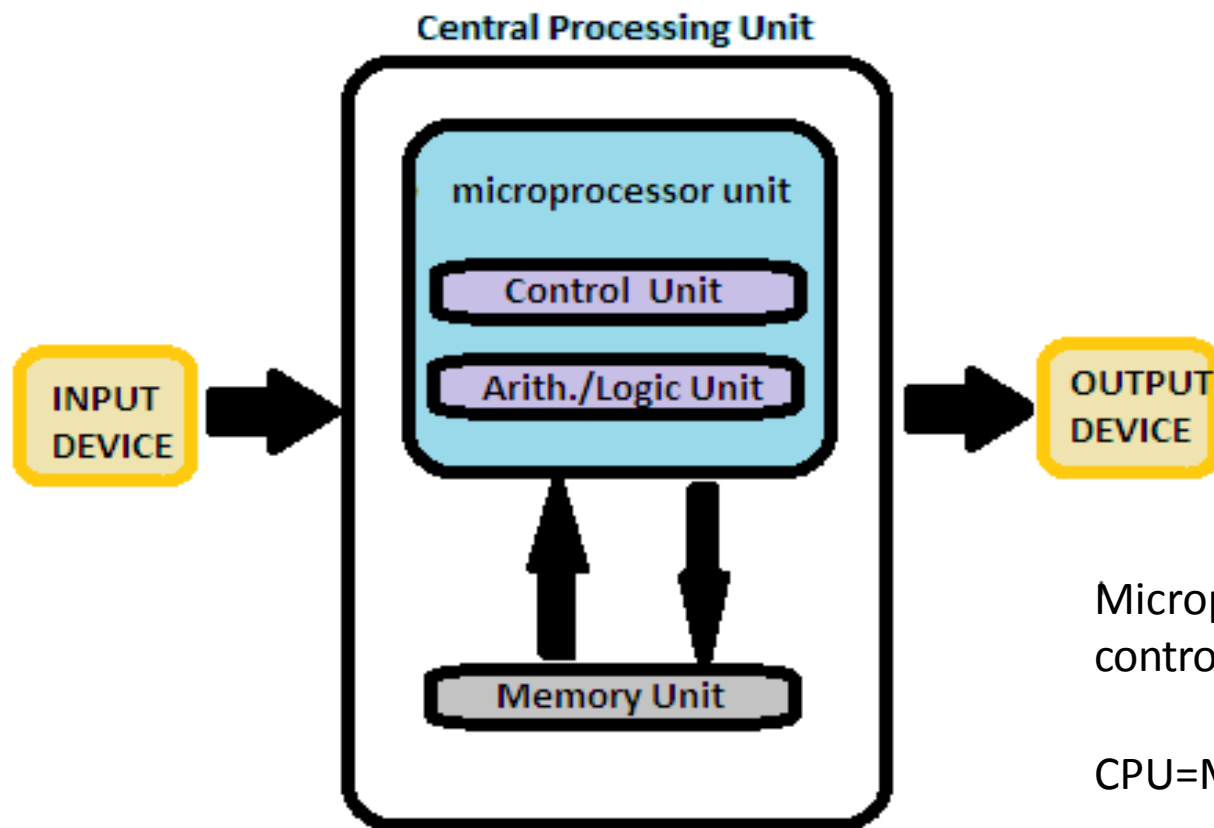
Basic Computer Organisation

Any digital computer performs five functions in gross term.

1. Take data as input
2. Stores data/instructions
3. Process those stored data
4. Generate the output
5. Control all above steps

Basic Computer Organisation

Functional components of a computer

Central Processing Unit

microprocessor unit

Control Unit

Arith./Logic Unit

INPUT DEVICE

OUTPUT DEVICE

Memory Unit

Von Neumen Computer Architecture

Microprocessor unit(mpu) = (CU+ALU)
control unit+arithmatica / logical unit

CPU=MPU+Memory Unit

Basic Computer Organisation

Input/Output Units

Input Unit

A device through which data and programs from the outside world enter the computer system.

Output unit

A device through which results stored in the computer memory are made available outside the computer system.

Basic Computer Organisation

Central processing unit – Comprises three parts

1. Arithmetic/Logic Unit

Performs basic arithmetic operations such as addition and subtraction
Performs logical operations such as AND, OR, and NOT. Most modern ALUs have a small amount of special storage units called registers that can be accessed faster than main memory.
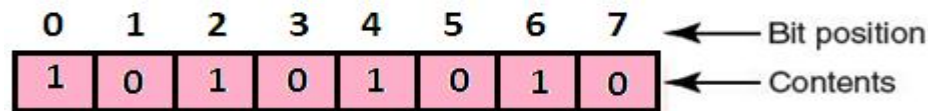
2. Control unit

It organizes the computer to work computer as single unit & generates control signals for various devices regarding read/write or execute operation

3. Memory

A collection of cells, each with a unique physical address

Most computers are byte-addressable

Cell at address 11111110 contains 10101010

0	1	2	3	4	5	6	7	← Bit position
1	0	1	0	1	0	1	0	← Contents

Memory Units – How much memory is required for a file/data/progam etc. is measured by memory units. Following are the memory units.

UNIT	STORAGE	ABBREVIATION
Bit	Binary Digit, Single 1 or 0	B
Nibble	4 bits	-
Byte/Octet	8 bits	B
Kilobyte	1024 bytes	KB
Megabyte	1024 KB	MB
Gigabyte	1024 MB	GB
Terabyte	1024 GB	TB
Petabyte	1024 TB	PB
Exabyte	1024 PB	EB
Zettabyte	1024 EB	ZB
Yottabyte	1024 ZB	YB

Basic Computer Organisation

RAM and ROM

Random Access Memory (RAM)

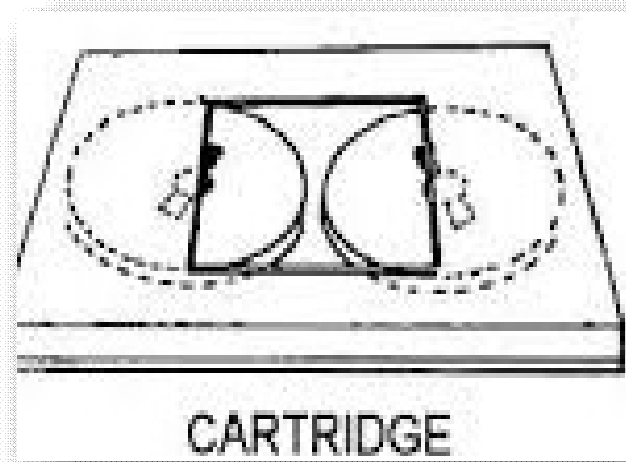Memory in which each location can be accessed and changed

Read Only Memory (ROM)

Memory in which each location can be accessed but *not* changed

RAM is volatile, ROM is not

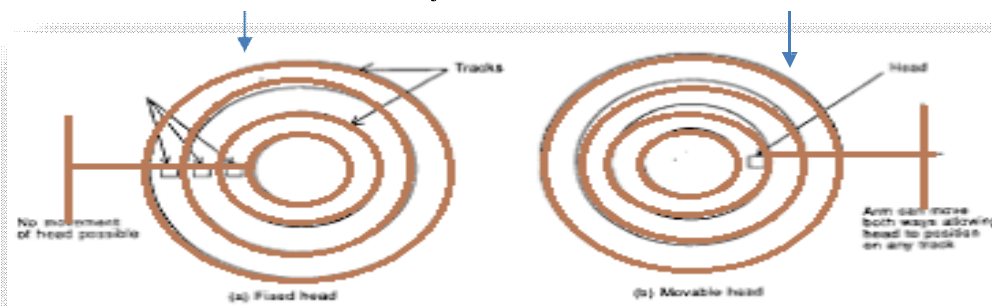Secondary Storage Devices

Magnetic Tape

mass auxiliary storage device

CARTRIDGE

Secondary Storage Devices

Hard disk

Fixed Head HDD / Movable head HDD

A hard disk is a set of stacked disks. Each disk has data recorded electromagnetically in concentric circles, or tracks, on the disk

Hard Drive Types

1. Parallel Advanced Technology Attachment (PATA)
2. Serial ATA (SATA)
3. Small Computer System Interface (SCSI)
4. Solid State Drives (SSD)

Upto 12 TB sized HDD is available in the market

Basic Computer Organisation

Input Devices

Input devices can send data or information to a computer or another device.

Keyboard: It is an input device which sends data in to the computer. The data send depends on the key pressed by the user.

Mouse: A mouse is a small handheld input device which controls a cursor in a graphical user interface. It can move and select text, files, folders etc. on our computer according to the user input.

Scanner: Scanner optically reads and document, file or image and then changes it into digital signal and sends to the computer.

OMR: optical mark recognition/ reader, is used to read marks on a document and send them to computer.

OCR: OCR stands for optical character Recognition, is an input device which reads printed text and sends that to computer.

MICR: Magnetic Ink Character Reader is an input device which generally finds application is banks to process cheques.

Microphone: it receives audio generated by some input source and sends the same to a computer.

Webcam: it sends the captured images to a computer.

Graphics Tablets: This input device is used to draw using hand.

Trackballs: an upside down mouse ,encased within a socket. Is a cursor control device.

Barcode reader: It is used to read the barcode of various items and feed the same to computer.

Gamepad: Also known as joy pad is the input controller for video games.

Joystick: these input devices are used to control video games.

Output Devices

A device that can receive data from computer or another device and create output with that data is called output device.

Examples of various output devices are as :

Monitor: A monitor is an output device that is responsible for receiving data from a computer and displaying that information as text or images for users to see.

Speakers: Receives sound signal from a computer and then plays that sound signal and thus we hear songs or music or any other audio.

Projector: Gets data from a computer and displays or projects the same information onto a screen or a wall. Projector cannot directly accept data from a user and send that data to another device.

Basic Computer Organisation

Both Input / Output Devices

An input/output device is capable of receiving data from users or another devices and also sending data to another devices or computers. That means a devices which can be used as both input device and output device are called Input / Output (I/O) devices. Some examples of input/output devices are as:

USB drive: Also known as pen drive or flash stick works as both input device to computer and as an output device. USB drives receive or save data from a computer as an input and it can also send data to a computer or another device.

Facsimile: Facsimile or FAX machine has a scanner which is an input device and a small printer to provide output.

Modems: It is used to transmit and receive data from one computer to another computer or other devices using telephone lines

CD-RW drives and DVD-RW drives: Receives data from a computer as input to copy onto and save into writable CD or DVD. We also use CDs or DVDs to transfer data to a computer.

Touch Screen: Touch screen is both input and output device. By touching the screen input is provided and being a screen, it is used as an output device.
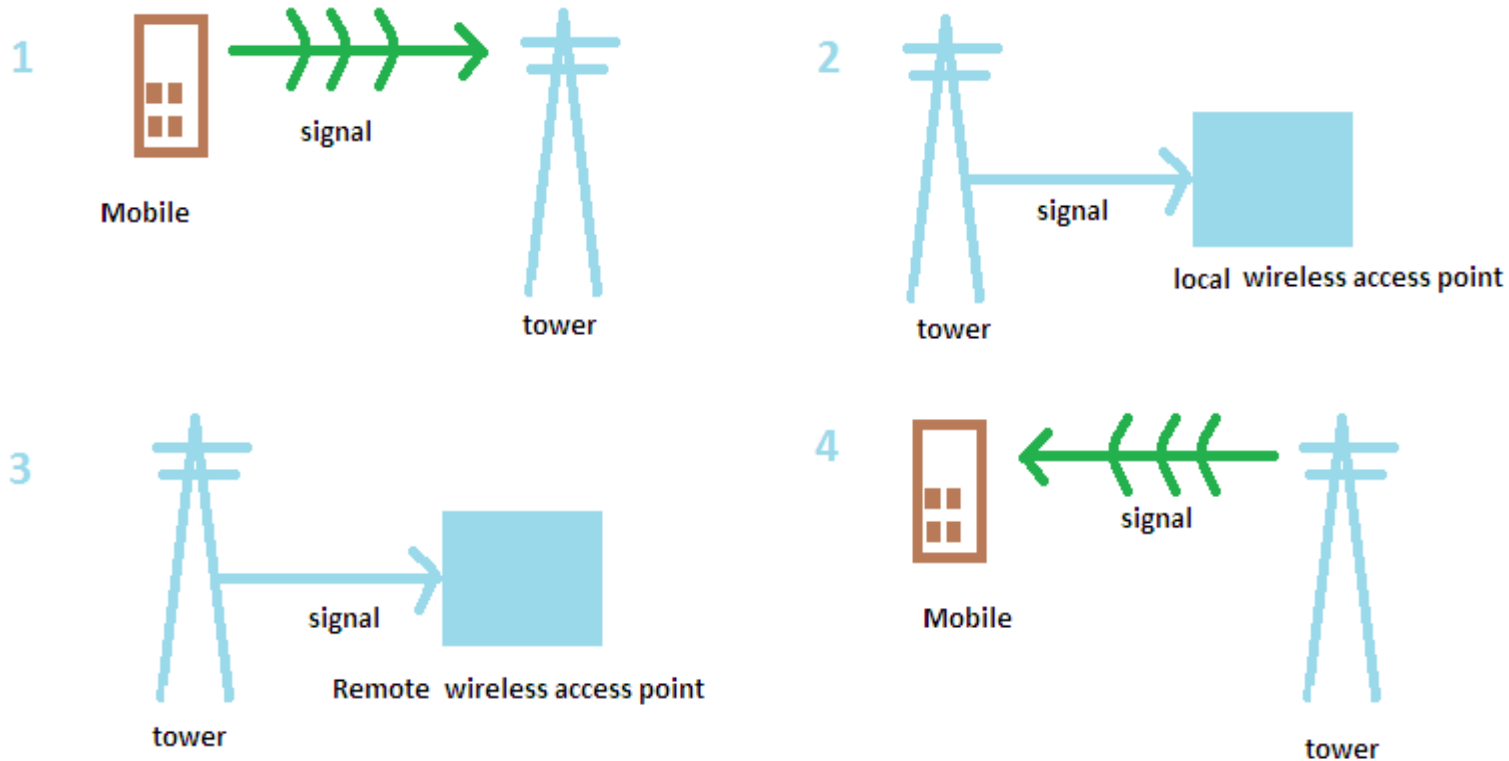
Headsets: Headset consists of speaker as an output device and microphone functions as an input device.

Mobile System organization

Mobile devices working

a Mobile Phone is essentially a two-way radio, consisting of a radio transmitter and a radio receiver.

1
Mobile → signal → tower

2
tower → signal → local wireless access point

3
tower → signal → Remote wireless access point

4
Mobile ← signal ← tower

Mobile Phone Components

1. A circuit board as brains of the phone
2. An antenna
3. A liquid crystal display (LCD)
4. A keyboard / A touch screen
5. A microphone
6. A speaker
7. A battery

Different types of touchscreen

1.TFT (Thin Film Transistor) LCD display is used for better image quality and high resolution. Since they are cheap to manufacture, they are found in budget phones usually.

2.IPS (In-Place Switching) LCDs are somewhat the advanced version of TFT LCDs in a way that they offer improved displays and are more battery friendly. Hence, they are found in high end phones.

3. RESISTIVE AND CAPACITIVE

There are generally two types of touchscreen LCD displays; Resistive and Capacitive. Resistive touchscreen has two layers of conductive material with a small gap between them while capacitive touchscreen consists of a layer of glass coated with transparent conductor. Capacitive screens tend to be more responsive than resistive screens and are therefore found in high end phones mostly.

4.OLED (Organic Light Emitting Diode) is a newer technology used in mobiles and monitors for display. They are better than LCDs because they offer fast response times, wider viewing angles and higher brightness. AMOLED (Active-Matrix Organic Light-Emitting Diode) and SUPER AMOLED displays are types of OLED display.

OLED types include passive-matrix OLEDs, active-matrix LEDs and transparent OLEDs

Smartphone Batteries and Their Types

Battery plays a huge role in any smartphone

Lithium Polymer batteries are the most advanced batteries available in the market right now. They are made up of plastic instead of metal, which makes them usable on a smartphone of any type. The Lithium Polymer batteries do not suffer from memory effect and offer 40 percent more battery life than others
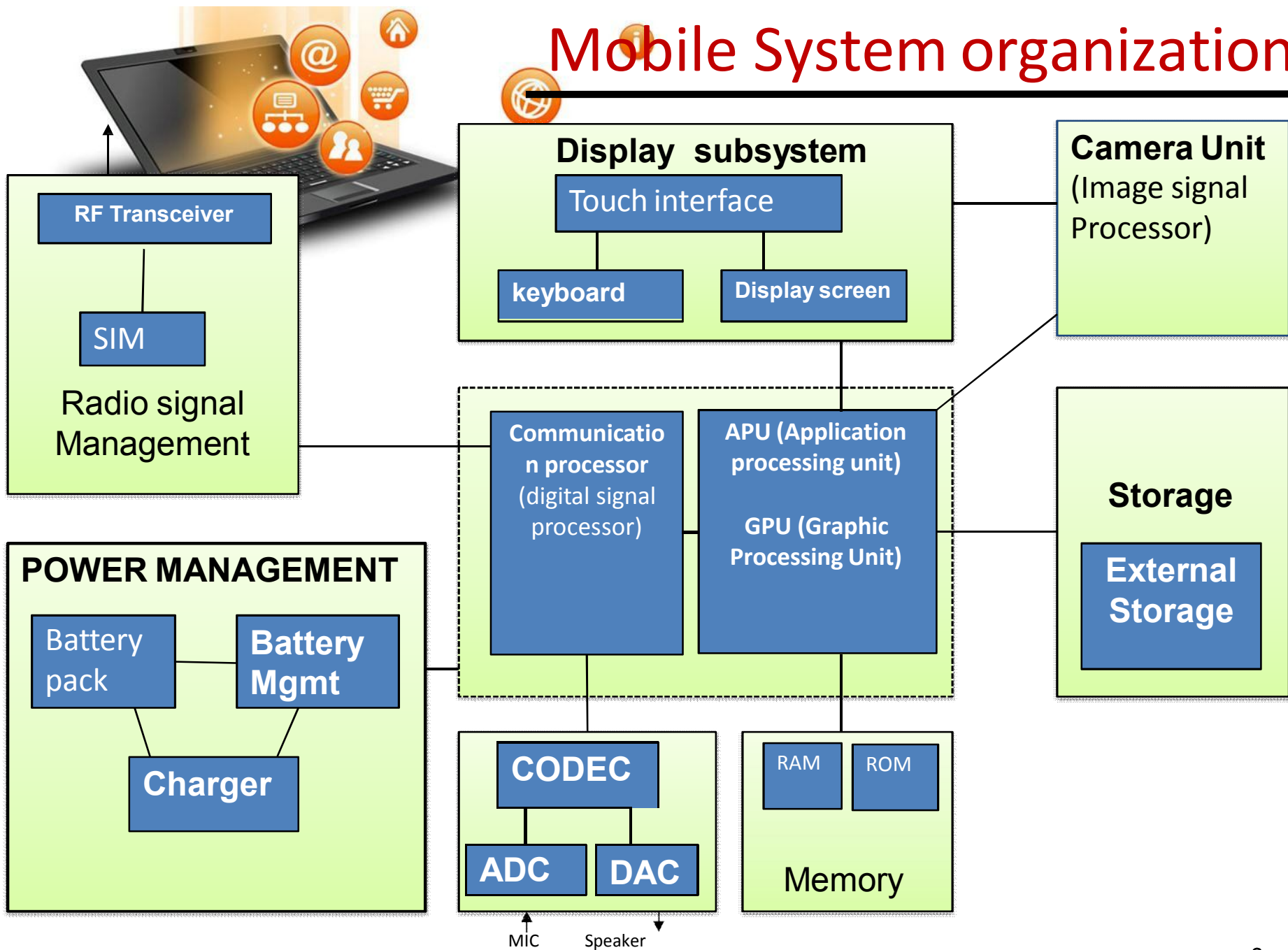
Lithium ion batteries are advanced and allow for a high charge capacity based on the size and weight of the battery. However, these these are slightly expensive. these lithium ion batteries will not remember the charge cycle, and as a result, the battery capacity will not be reduced.

Nickel Cadmium These are the cells that suffer from memory effect. And, the memory effect will result in reducing the capacity of the battery and its lifespan as well.

Nickel Metal Hydride batteries are kind of an upgrade to the Nickel Cadmium batteries, and they boast of the same size as the latter. Nickel Metal Hydride batteries offer 30 to 40 percent more battery juice than the others

Battery Size : Measured in mAh.like 2000 mAh,4000 mAh   etc.

fppt.com

Mobile System organization

Display subsystem

Touch interface

keyboard

Display screen

Camera Unit
(Image signal Processor)

RF Transceiver

SIM

Radio signal Management

Communication processor (digital signal processor)

APU (Application processing unit)

GPU (Graphic Processing Unit)

Storage

External Storage

POWER MANAGEMENT

Battery pack

Battery Mgmt

Charger

CODEC

ADC

DAC

MIC   Speaker

RAM   ROM

Memory

Functions of different components of mobile device

RF transceiver – Receive and send radio signal from to mobile device with mobile network(tower).

SIM - A subscriber identity module is an integrated circuit that store the international mobile subscriber identity (IMSI) number and its related key, which are used to identify and authenticate subscribers on mobile telephony devices. It is also possible to store contact information on many SIM cards.

battery pack - batteries are miracles of chemical engineering, holding huge amounts of energy to keep mobile devices running for hours.

Battery management - an electronic system that manages a rechargeable battery (cell or battery pack), such as by protecting the battery from operating outside its safe operating area[clarification needed], monitoring its state, calculating secondary data, reporting that data

Functions of different components of mobile device

A battery charger- or recharger, is a device used to put energy into a secondary cell or rechargeable battery by forcing an electric current through it.

Touch interface – either <u>keyboard</u> based where user have to press key and commands are given to mobile device or <u>touchscreen</u> based where user touch the screen to give commands.

Communication processor - is used to create an interface between radio signal management and APU / GPU.

APU – a microprocessor processes application based data.

GPU – a microprocessor processes graphical data to how to display.

Codec - is short for "coder-decoder." a device used to encode audio/video data.

ADC - Analog to digital converter.

DAC – Digital to analog converter.

Functions of different components of mobile device

A Phone's memory. - It includes RAM and ROM. RAM equals the memory (or memory bar) of the computer, while ROM is the device's internal storage, equaling the hard disk of the computer. The bigger the RAM, the more software the phone runs smoothly; While the bigger the ROM, the more platform data it can store.

Camera unit – different components to take picture like lens/image signal processor etc.

External storage - in some cases, mostly android or windows OS, phones support an external microSD card to further expand the storage available by default.