

Micro processor an integrated circuit which can perform arithmetic and Logical operation
only consist CPU

Micro controller IC consist of CPU, fixed amount of RAM, ROM and I/O ports
used to control embedded system

Embedded System Special purpose computer system designe to perform one or a few dedicated function

Mechatronics system mechanical hardware integrated with information driven system

n-bit processor -processor works only on n-bit of data at a time.
-data larger than n-bit has to be broken into n-bit pieces to be processed.

MPU

<u>MPU</u>	<u>MPU</u>
- small computer on a single IC	- Computer central processing unit on a single chip
- fixed amount of RAM, ROM and I/O ports	- no RAM, no ROM, and no I/O port only CPU on chip
- can't add any external RAM, ROM, I/O ports	- complex - expensive as we need to buy peripherals (RAM, ROM, ...)
suitable for application that cost and space critical	- enable designer to add amount of RAM, ROM, and I/O ports which he need

Von-Neuman

<u>Von-Neuman</u>	<u>Harvard</u>
- instruction and data store on a single memory	- memory for data and another for instruction.
- single Data bus fetch Data and instruction	bus from memory Data to CPU and bus from ROM to CPU

Mask ROM

- not user programmable ROM
- only programmed by IC Manufacturer
- cheaper than other ROM
- OTP

Subject : Date :

PROM Programmable ROM

- user can burn information on it
- a fuse for every bit
- can only burn one time (OTP)

EPROM Erasable PROM

- can programmed and erased thousand times
- use UV-EPROM to erase its contents
- use 12,5 Volt or higher to burn
- can't erased while it's in the system board

EEPROM Electrically EPROM

- it's erase by electric
- select part which we need erase
- can programmed while it's in system board
- cost higher than EEPROM

Flash memory

- it's erase by electrical
- eraser done block by block
- can programmed while it's in system board

SRAM Static RAM

- storage cells are made of flip flop
- don't require to refresh
- cell requires 6 transistor to build 1 bit
- expensive

DRAM Dynamic RAM

- use capacitor to store &
- capacitor require refreshing due to charge leakage
- cells require 1 transistor + capacitor
- cheaper than SRA

NVRAM Non Volatile RAM

- R/w allowing
- when power is off content are not lost.
- can return contents up to 10 years.
- use internal Lithium Battery
- another type of NVRAM combine SRAM and EEPROM

ROM is read only memory although I can write on it

- on the normal operation CPU can't write to it
- may be written by an external device
- may be special configuration within system so the CPU

have access to write to it

Type	Volatile	writable	Erase size	Max Erase cycle	Cost/byte	speed
SRAM	✓	✓	Byte	unlimited	Expensive	Fast
DRAM	✓	✓	Byte	unlimited	moderate	moderate
Masked ROM	X	X	—	—	cheap	Fast
PROM	X	once with device programmer	—	—	Moderate	Fast
EPROM	X	yes, with device program	Entire chip	Limited	Moderate	Fast
EEPROM	X	✓	Byte	Limited	Expensive	Fast read slow write
Flash	X	✓	Sector	Limited	Moderate	Fast read slow write
GNV RAM	X	✓	Byte	unlimited	Expensive	Fast