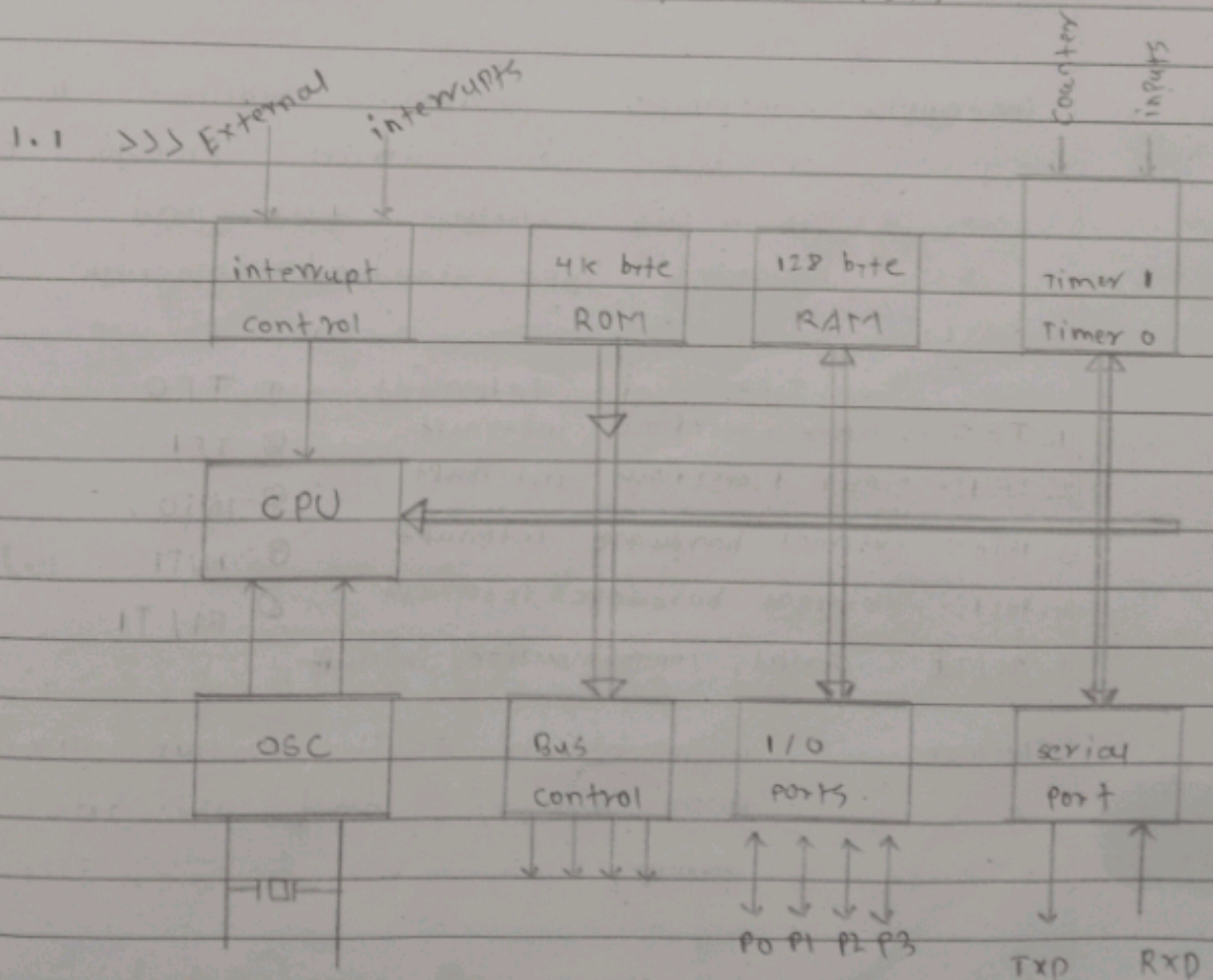


MES - chapter 1 || Basics of microcontroller 8051

- 1.1 - General architecture of microcontroller
- 1.2 - Comparison of microprocessor & microcontroller
- 1.3 - Architecture of 8051
- 1.4 - Pin configuration and signal description of 8051
- 1.5 - Memory organization of 8051
- 1.6 - Special feature of 8051 - Boolean processor, Power saving options - idle and power down mode, Derivatives of 8051 (8951, 8952, 8031, 8751)



* Explanation of micro^{control}ler 8051

→ microcontroller 8051 contain is designed by intel in 1981 it is an 8-bit microcontroller it is built with 40 pins, 4 kb ROM, 128 bytes of RAM, 2 16 bit timer

CPU - CPU act as a mind of any processing machine it synchronizes and manages all processes that carried out in microcontlo.

interrupts - interrupts provide a method to postpone or delay the current process, performs a sub-routine task and then restart the standard program again

Type of interrupt -

- | | |
|---|---------|
| 1. TFO:- timer 0 overflow interrupt | ① TFO |
| 2. TFI:- timer 1 overflow interrupt | ② TFI |
| 3. INT0:- external hardware interrupt | ③ INT0 |
| 4. INT1:- external hardware interrupt | ④ INT1 |
| 5. RI/TI:- serial communication interrupt | ⑤ RI/TI |

Memory - microcontroller 8051 contain 4k byte of ROM memory and 128 byte ram memory

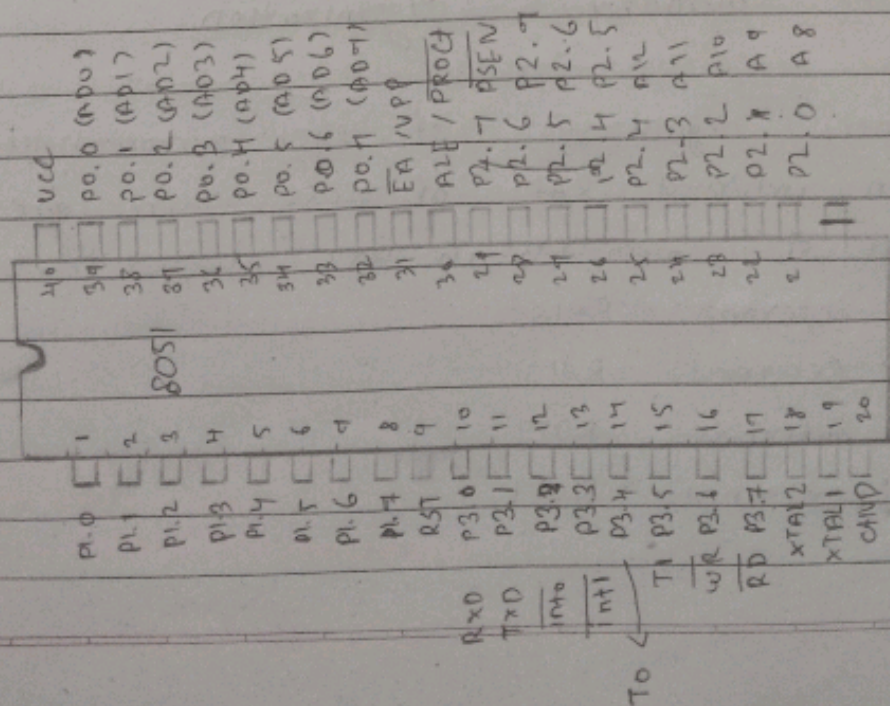
Bus - Bus is group of wire which uses as a communication channel of data transfer. microcontroller 8051 contain Address bus & Data bus

OSC - As The microcontroller is digital circuit therefore it needs timer for their operation to perform timer operation inside microcontroller it required externally connected or one-chip OSC (oscillator)

1.2 >>> Comparison of microprocessor & microcontroller.

Microprocessor	Microcontroller
1> Externally connected with input-output components	1> input-output components are embedded
2> not cost-effective	2> cost-effective
3> The total consumption of power is high	3> total consumption of power is less
4> microprocessor contain only a CPU	4> microcontroller contain CPU, memory, I/O all integrated into one chip

1.4 >>> Pin diagram MK
014
A3



* Explanation of microcontroller 8051 pin diagram:

- 1) Pin 1 to 8 - These pins are known as port 1
- 2) Pin 9 - it is RESET pin which is used to reset the microcontroller to its initial values
- 3) Pin 10 to 17 - These pins are known as port 3
- 4) pin 18 & 19 - These pins used for to get the system clock
- 5) Pin 20 - To provide the power supply to circuit
- 6) Pin 21 to 28 - These pins are known as port 2
- 7) Pin 29 - This is PSEN pin which stands for program store enable
- 8) pin 30 - This is EA pin which stands for External Access
- 9) Pin 31 - This is ALE pin which stands for address Latch enable
- 10) Pin 32 to 39 - These pins known as port 0
- 11) pin 40 - This pin is used to provide power supply to the circuit

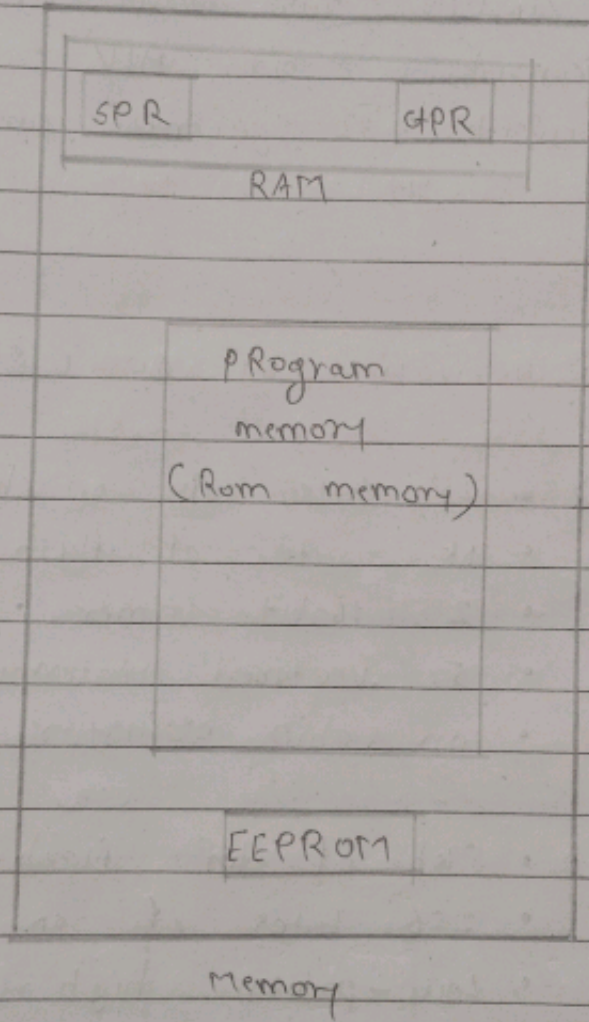
1.5 >>> memory organization

- memory organization of 8051 microcontroller is based upon internal RAM of 8051. There are four types of memory in 8051

- internal RAM
- external RAM
- internal ROM
- external ROM

in this memory is divided into program memory & data memory

- * Program memory - it store the store the permanent programme & it also known as ROM
- * Data memory - it store temporary program it also known as RAM



SPR - Special purpose Register.

GPR - general purpose register, use for data storage.

EEPROM - Erasable.

ROM

- * 4 K byte
- * non-volatile
- * flash memory is area of ROM

RAM

- * 128 byte
- * Volatic
- * stack memory is area of RAM

* Features of 8051 microcontroller

- 1) it consists 4 k byte ROM
- 2) it consists 128 byte RAM
- 3) 16 bit Address bus.
- 4) 8 bit data bus.
- 5) it has four 8-bit input/output port
- 6) it consists two 16-bit timer/counter
- 7) it consists 8-bit ALU
- 8) it consists 32 general purpose register each has 8-bit

1.6 >>> Derivatives of 8051 (8951, 8952, 8031, 8751)

- 8951 >>>
- 128 bytes of on chip data memory
 - 4k byte of flash memory
 - 2 16-bit timer, 4 I/O ports
 - 5 vectored interrupts
 - on chip oscillator & a serial port

- 8952 >>>
- 8kb of ISP flash memory
 - 256 bytes of on chip RAM
 - Low-power, high-performance CMOS 8-bit microcontroller
 - This powerful microcontroller is suitable for many embedded control application
 - non-volatile memory technology

- 8031 >>>
- The 8031 is The member of mcs-51 family of 8-bit microcontroller
 - 4 I/O ports , 2 16-bit timer / counter on chip oscillator & serial port
 - 128 byte internal RAM and can utilize up to 64 KB of external data memory
 - The microcontroller do not have on chip ROM and must use external program memory

- 8751 >>>
- it consists of memory & interrupts, timer, same as in 8051 microcontroller but it has UV-EPROM
 - The on-chip ROM for The 8751 is UV-EPROM
 - it takes around 20 minutes to erase. The 8751 before it can be programmed again

* >>> chart compare (8031, 8051, 8751, 8951, 8952)

microcontroller	RAM	ROM	16-bit timer / counter	vectored interrupts	full duplex I/O
8031	128	None	2	5	1
8051	128	4k ROM	2	5	1
8751	128	4k EPROM	2	5	1
8951	128	4k flash memory	2	5	1
8952	256	8k flash memory	3	6	1

1.6 >>> boolean processor, power saving options idle & power down mode

boolean processor >>> • boolean processor is a type of a processor that can perform boolean logic operations such as AND, OR, NOT, XOR.

• 8051 microcontroller does not have a built-in boolean processor but it has logical instructions such as AND, OR, NOT, XOR which can be used to perform boolean operations.

Power saving options >>> • Power saving options are features that enable a device to reduce its power consumption & reduce energy consumption.

• 8051 microcontroller has two power saving modes: idle mode & power down mode.

• idle mode - • in this mode CPU stops but timer & serial communication continue running.

• This mode can be useful for applications that need to perform background tasks.

* power down mode - The CPU, timers, serial communication stop, reducing power consumption to a minimum.

• This mode is used in applications that need to save power when the microcontroller is not performing any tasks.