



LECTURE 3

Microprocessor

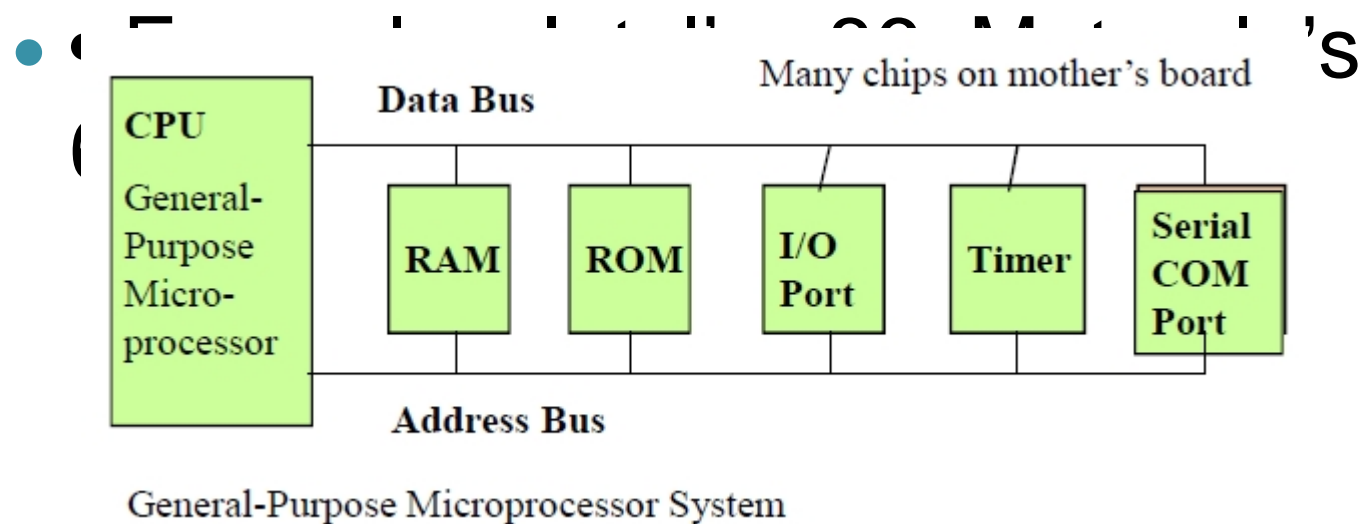


Topics to be covered

- Embedded Controller

Microprocessors:

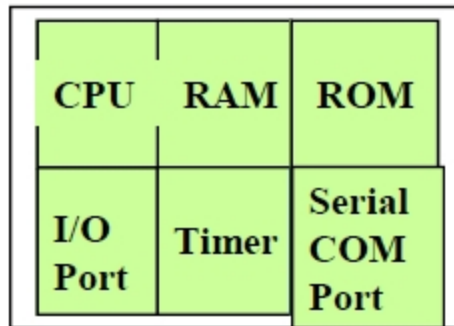
- CPU for Computers
- No RAM, ROM, I/O on CPU chip itself



Microcontroller :

A smaller computer

- On-chip RAM, ROM, I/O ports...
- Example : Motorola's 6811, Intel's 8051, Zilog's Z8 and PIC 16X



A single chip

Microcontrollers

A Microcontroller is essentially a small and selfsufficient

- **computer on a chip, used to control devices**
- **It has all the memory and I/O it needs on board**
- **Is not expandable – no external bus interface**

Characteristics of a Microcontroller

- **Low cost, on the order of \$1**
- **Low speed, on the order of 10 KHz – 20 MHz**
- **Low Power, extremely low power in sleep mode**
- **Small architecture, usually an 8-bit architecture**
- **Small memory size, but usually enough for the type of**

application it is intended for. Onboard Flash.

- **Limited I/O, but again, enough for the type of application**

Microprocessors

A Microprocessor is fundamentally a collection of

- **on/off switches laid out over silicon in order to perform**
- **Computations**

Characteristics of a Microprocessor

- **High cost, anywhere between \$20 - \$200 or more!**
- **High speed, on the order of 100 MHz – 4 GHz**
- **High Power consumption, lots of heat**
- **Large architecture, 32-bit, and recently 64-bit architecture**
- **Large memory size, onboard flash and cache, with an external bus interface for greater memory usage**
- **Lots of I/O and peripherals, though Microprocessors tend to be short on General purpose I/O**

Microprocessor

- CPU is stand-alone, RAM, ROM, I/O, timer are separate
- designer can decide on the amount of ROM, RAM and I/O ports.
- Different Ics for memory and I/O.
- Single memory map in which data & code will lie.
- expansive
- versatility
- general-purpose

Microcontroller

- CPU, RAM, ROM, I/O and timer are all on a single chip
- fix amount of on-chip ROM, RAM, I/O ports
- Memory and I/O are inbuilt.
- Separate data and code memory.
- for applications in which cost, power and space are critical
- single-purpose.
- Compared to up, more numbers of pins are multifunctioned.