**Chapter 1: STARTING FROM SCRATCH**

**Topic – 1: Microcontrollers v/s Microprocessors**

**Differences**

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| **Microcontroller** | **Microprocessor** |
| **Can work as standalone system.** | **Needs additional peripherals.** |
| **Slower processing with speed in MHz.** | **Faster processing with speed in GHz.** |
| **Wide range of applications.** | **Application specific.** |
| **Cheaper** | **Expensive** |
| **Has onboard RAM, ROM, I/O units etc.** | **Peripherals has to be attached separately.** |
| **Contains several processing units, but not as much as CPU offers.** | **Can control wide range of processing units very efficiently.** |
| **Less complex circuit.** | **More complex circuit.** |
| **Low power consumption.** | **High power consumption.** |
| **Fast communication with onboard units.** | **Slow communication with peripherals.** |
| **Supports small instruction set.** | **Supports large & powerful instruction set.** |
| **Instruction set is good at handling input/ output operations.** | **Instruction set is good at handling memory management.** |
| **Used in embedded commercial appliances.** | **Used for general purpose computing.** |

**Advantages of Microcontroller Over Microprocessor**

* Microcontrollers are **cheaper**.
* More **compact**, as peripherals are closely packed.
* Hence, more **portable** & **faster** in communicating with peripherals.
* **Low power consumption** due to less peripherals.

**Arduino Boards**

* **Arduino** boards contain **two microcontrollers** & are known as **development board**.
* One of these two microcontroller is **ATMega328P** i.e. the main brain of the board.
* Another one is used for controlling **USB interfaces**.

**Topic – 2: Other Computing Devices**

**Microcomputer**

* A system built on **microprocessor** that can be used as a **personal computer**.
* Nowadays **microprocessors**, **microcontrollers**, **development boards** or any kind of boards are coming with various features.
* So, the line between them often seems blurred due to erasing differences.

**Some Additional Computing Devices**

* **Microcomputers:** Alternative term for **microcontrollers** & can go up to **32-bits**.
* **Minicomputers:** Alternative term for **servers**, more powerful than **microcontrollers** & can go up to **64-bits**.
* **Mainframes:** More powerful than **servers** with massive memory storing capacity & of **more** than **64-bit**.
* **Supercomputers:** Fastest computers with **multiple processors** but only a few of them exist & uses **FLOPS** for measuring **speed** instead **MIPS**.

**Facts & Term References**

* **Mainframes** are used in defence sectors.
* **FLOPS:** Floating point operations per second.
* **MIPS:** Million instructions per second.