Microcontroller architecture

ISA and Microarchitecture

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Definition of architecture

Architecture

Architecture describes the internal organization of a computer in an abstract way; that is, it defines the capabilities of the computer and its programming model.[1] It outlines how a computer's hardware components interact and work together to execute programs and process data.

In embedded systems, architecture plays a crucial role because these systems are mostly designed for specific tasks rather than general-purpose computing. Some things to keep in mind when choosing an architecture are:

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- **Cost and size:** Choosing a microcontroller with just enough features to develop the intended functionality is key to saving money, but also in some cases the size, which in turn also reduces the cost.

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- **Performance and memory:** Depending on the application, some devices might only run certain OS which is targeted for a specific arquitechture, or maybe they need to be compatible with external memory.

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ISA

Instruction Set Architecture

An Instruction Set Architecture (ISA) is part of the abstract model of a computer that defines how the CPU is controlled by the software. The ISA acts as an interface between the hardware and the software, specifying both what the processor is capable of doing as well as how it gets done. [1]

The ISA provides the only way through which a user is able to interact with the hardware. It can be viewed as a programmer's manual because it's the portion of the machine that's visible to the assembly language programmer, the compiler writer, and the application programmer.

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[1]   Alan Clements. *Principles of Computer Hardware*. Oxford University Press, 2006.