EC4127- Embedded Systems

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Lecture 4

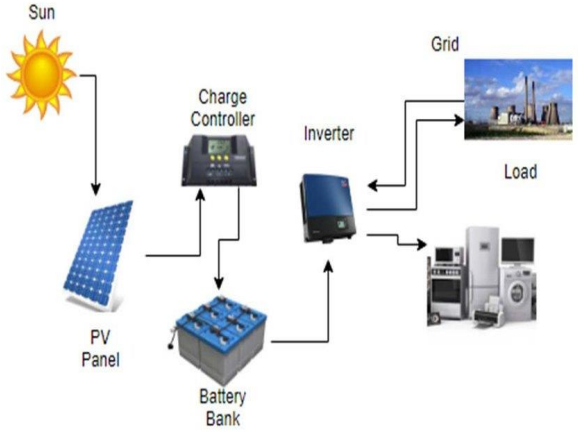
Introduction to Embedded Systems

Agenda

- Small scale embedded system
- Medium scale embedded system
- Sophisticated Embedded Systems

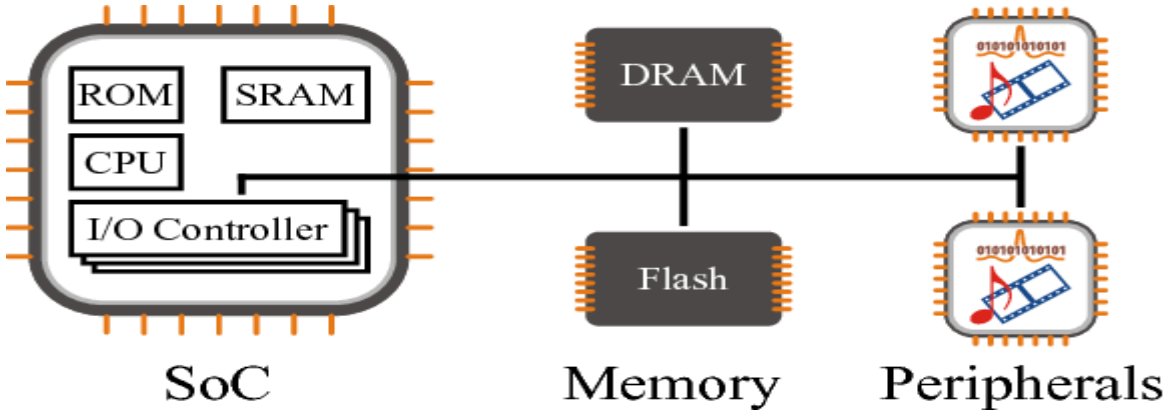
Small scale embedded system

These types of embedded systems are designed with a single 8-bit or 16-bit microcontroller. They have tiny scaled hardware, software complexities and involve board-level design. They may even be battery operated. When embedded software is developing for this tiny scaled hardware, an editor, an assembler or cross assembler, specific to the microcontroller or processor used, are the main programming tools. Usually, óC programming languageô is used for developing these systems. óCô program compilation is done into the assembly, and executable codes are then appropriately located in the system memory. The software has to fit within the memory existing and keep in view the need to limit power dissipation when system is running continuously.



Medium scale embedded system

These systems are usually designed with a single or few 16-bit or 32-bit microcontrollers or Digital Signal Processor (DSPs) or Reduced Instruction Set Computers (RISCs) being used. These system have both hardware and software complexities. For complex software design of medium scale embedded system, there are the following programming tools: RTOS, Source code engineering tool, Simulator, Debugger and Integrated Development Environment (IDE). Software tools also give the clarifications to the hardware complexities. An assembler is of slight use as a programming tool. These systems may also utilize the readily available Application-Specific Standard Product (ASSPs) and IPs for the various functions. For example, for the bus interfacing, encrypting, deciphering, discrete cosine transformation and inverse transformation, TCP/IP protocol is stacking and network connecting functions.



Sophisticated Embedded Systems

Sophisticated embedded systems have massive hardware and software complexities and may require ASIPs, IPs and PLAs scalable or configurable processors and programmable logic arrays. They are used for cutting edge applications that require hardware and software co-design and integration in the final system. They are constrained by the processing speeds available in their hardware units. Certain software functions such as encryption and deciphering algorithms, discrete cosine transformation and inverse transformation algorithms, TCP/IP protocol stacking and network driver functions are implemented in the hardware to obtain additional speeds by saving time. Some of the functions of the hardware resources in the system are also implemented by the software. Development tools for these systems may not be readily available at a reasonble cost or may not be available at all. In some cases, a compiler or retarget able (Compiler configures according to the specific target) compiler might have to be developed for these.