

Embedded Systems Hardware For Software Engineers

Embedded system

electrical grids rely on multiple embedded systems networked together. Generalized through software customization, embedded systems such as programmable logic

An embedded system is a specialized computer system—a combination of a computer processor, computer memory, and input/output peripheral devices—that has a dedicated function within a larger mechanical or electronic system. It is embedded as part of a complete device often including electrical or electronic hardware and mechanical parts.

Because an embedded system typically controls physical operations of the machine that it is embedded within, it often has real-time computing constraints. Embedded systems control many devices in common use. In 2009, it was estimated that ninety-eight percent of all microprocessors manufactured were used in embedded systems.

Modern embedded systems are often based on microcontrollers (i.e. microprocessors with integrated memory and peripheral interfaces),...

Embedded software

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Embedded software is computer software, written to control machines or devices that are not typically thought of as computers, commonly known as embedded systems. It is typically specialized for the particular hardware that it runs on and has time and memory constraints. This term is sometimes used interchangeably with firmware.

A precise and stable characteristic feature is that no or not all functions of embedded software are initiated/controlled via a human interface, but through machine-interfaces instead.

Manufacturers build embedded software into the electronics of cars, telephones, modems, robots, appliances, toys, security systems, pacemakers, televisions and set-top boxes, and digital watches, for example. This software can be very simple, such as lighting controls running on an 8...

Computer engineering

networks, computer architecture and operating systems. Computer engineers are involved in many hardware and software aspects of computing, from the design of

Computer engineering (CE, CoE, CpE, or CompE) is a branch of engineering specialized in developing computer hardware and software.

It integrates several fields of electrical engineering, electronics engineering and computer science. Computer engineering may be referred to as Electrical and Computer Engineering or Computer Science and Engineering at some universities.

Computer engineers require training in hardware-software integration, software design, and software engineering. It can encompass areas such as electromagnetism, artificial intelligence (AI), robotics, computer networks, computer architecture and operating systems. Computer engineers are involved in many hardware and software aspects of computing, from the design of individual microcontrollers, microprocessors, personal computers...

Hardware description language

perform some tasks of both hardware design and software programming. SystemC is an example of such—embedded system hardware can be modeled as non-detailed

In computer engineering, a hardware description language (HDL) is a specialized computer language used to describe the structure and behavior of electronic circuits, usually to design application-specific integrated circuits (ASICs) and to program field-programmable gate arrays (FPGAs).

A hardware description language enables a precise, formal description of an electronic circuit that allows for the automated analysis and simulation of the circuit. It also allows for the synthesis of an HDL description into a netlist (a specification of physical electronic components and how they are connected together), which can then be placed and routed to produce the set of masks used to create an integrated circuit.

A hardware description language looks much like a programming language such as C or ALGOL...

Hardware-in-the-loop simulation

real-time embedded systems. HIL simulation provides an effective testing platform by adding the complexity of the process-actuator system, known as a

Hardware-in-the-loop (HIL) simulation, also known by various acronyms such as HiL, HITL, and HWIL, is a technique that is used in the development and testing of complex real-time embedded systems. HIL simulation provides an effective testing platform by adding the complexity of the process-actuator system, known as a plant, to the test platform. The complexity of the plant under control is included in testing and development by adding a mathematical representation of all related dynamic systems. These mathematical representations are referred to as the "plant simulation". The embedded system to be tested interacts with this plant simulation.

MontaVista

MontaVista Software is a company that develops embedded Linux system software, development tools, and related software. Its products are made for other corporations

MontaVista Software is a company that develops embedded Linux system software, development tools, and related software. Its products are made for other corporations developing embedded systems such as automotive electronics, communications equipment, mobile phones, and other electronic devices and infrastructure.

MontaVista is based in Santa Clara, California and was founded in 1999 by James "Jim" Ready (formerly at Mentor Graphics and creator of Versatile Real-Time Executive (VRTX)) and others. On November 10, 2009 Cavium Networks announced that it had signed a definitive agreement to purchase MontaVista for \$50 million. After Cavium got acquired by Marvell, Montavista operated as an independent entity.

Software engineering

programming expertise to develop software systems that meet user needs. The terms programmer and coder overlap software engineer, but they imply only the construction

Software engineering is a branch of both computer science and engineering focused on designing, developing, testing, and maintaining software applications. It involves applying engineering principles and computer programming expertise to develop software systems that meet user needs.

The terms programmer and coder overlap software engineer, but they imply only the construction aspect of a typical software engineer workload.

A software engineer applies a software development process, which involves defining, implementing, testing, managing, and maintaining software systems, as well as developing the software development process itself.

System on a chip

engineers have employed simulation acceleration, emulation or prototyping on reprogrammable hardware to verify and debug hardware and software for SoC

A system on a chip (SoC) is an integrated circuit that combines most or all key components of a computer or electronic system onto a single microchip. Typically, an SoC includes a central processing unit (CPU) with memory, input/output, and data storage control functions, along with optional features like a graphics processing unit (GPU), Wi-Fi connectivity, and radio frequency processing. This high level of integration minimizes the need for separate, discrete components,

thereby enhancing power efficiency and simplifying device design.

High-performance SoCs are often paired with dedicated memory, such as LPDDR, and flash storage chips, such as eUFS or eMMC, which may be stacked directly on top of the SoC in a package-on-package (PoP) configuration or placed nearby on the motherboard. Some...

Objective Interface Systems

software and hardware Embedded communications middleware software and hardware High-performance communications middleware software and hardware Secure communications

Objective Interface Systems, Inc. is a computer communications software and hardware company. The company's headquarters are in Herndon, Virginia, USA. OIS develops, manufactures, licenses, and supports software and hardware products that generally fit into one or more of the following markets:

Real-time communications middleware software and hardware

Embedded communications middleware software and hardware

High-performance communications middleware software and hardware

Secure communications software and hardware

A popular OIS product is the ORBexpress CORBA middleware software. ORBexpress is most popular in the real-time and embedded computer markets. OIS supports the software version

ORBexpress on more than 6,000 computing platforms (combinations of the versions of CPU families, operating...

Hardware architecture

called a hardware design model, allows hardware designers to understand how their components fit into a system architecture and provides to software component

In engineering, hardware architecture refers to the identification of a system's physical components and their interrelationships. This description, often called a hardware design model, allows hardware designers to understand how their components fit into a system architecture and provides to software component designers important information needed for software development and integration. Clear definition of a hardware architecture allows the various traditional engineering disciplines (e.g., electrical and mechanical engineering) to work more effectively together to develop and manufacture new machines, devices and components.

Hardware is also an expression used within the computer engineering industry to explicitly distinguish the (electronic computer) hardware from the software that runs...

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