

Topic covered are: Embedded systems

Classification of Embedded systems

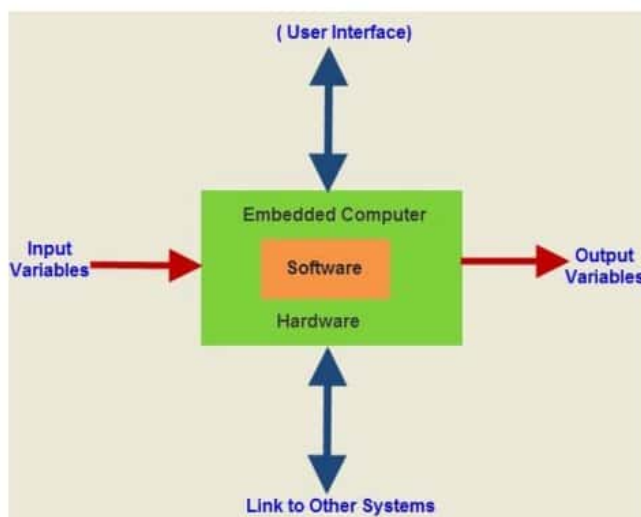
Applications of Embedded systems

An embedded system is an electronic system that has a software and is embedded in computer hardware. It is programmable or non- programmable depending on the application. An Embedded system is defined as a way of working, organizing, performing single or multiple tasks according to a set of rules. In an embedded system, all the units assemble and work together according to the program. Examples of embedded systems include numerous products such as microwave ovens, washing machine, printers, automobiles, cameras, etc. These systems use microprocessors, microcontrollers as well as processors like DSPs. This article gives an overview of what is an embedded system and types of embedded system.

The important characteristics of an embedded systems are speed, size, power, reliability, accuracy, adaptability. Therefore, when the embedded system performs the operations at high speed, then it can be used for real -time applications. The Size of the system and power consumption should be very low, then the system can be easily adaptable for different situations.

What is an embedded system?

An Embedded system is a combination of computer hardware and software. As with any electronic system, this system requires a hardware platform and that is built with a microprocessor or microcontroller. The Embedded system hardware includes elements like user interface, Input/Output interfaces, display and memory, etc. Generally, an embedded system comprises power supply, processor, memory, timers, serial communication ports and system application specific circuits.



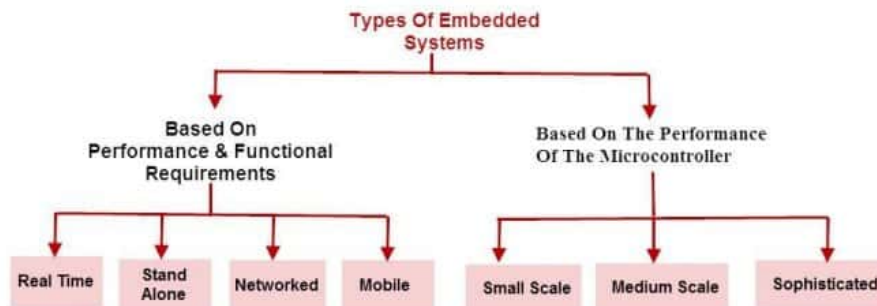
Embedded System

Embedded system software is written in a high-level language, and then compiled to achieve a specific function within a non-volatile memory in the hardware. Embedded

system software is designed to keep in view of three limits. They are availability of system memory and processor speed. When the system runs endlessly, there is a need to limit the power dissipation for events like run, stop and wake up.

Types of Embedded Systems

Embedded systems can be classified into different types based on performance, functional requirements and performance of the microcontroller.



Types of Embedded systems

Embedded systems are classified into four categories based on their performance and functional requirements:

- Stand alone embedded systems
- Real time embedded systems
- Networked embedded systems
- Mobile embedded systems

Embedded Systems are classified into three types based on the performance of the microcontroller such as

- Small scale embedded systems
- Medium scale embedded systems
- Sophisticated embedded systems

Stand Alone Embedded Systems

Stand alone embedded systems do not require a host system like a computer, it works by itself. It takes the input from the input ports either analog or digital and processes, calculates and converts the data and gives the resulting data through the connected device-Which either controls, drives and displays the connected devices. Examples for the stand alone embedded systems are mp3 players, digital cameras, video game consoles, microwave ovens and temperature measurement systems.

Real Time Embedded Systems

A real time embedded system is defined as, a system which gives a required o/p in a particular time. These types of embedded systems follow the time deadlines for completion of a task. Real time embedded systems are classified into two types such as soft and hard real time systems.

Networked Embedded Systems

These types of embedded systems are related to a network to access the resources. The connected network can be LAN, WAN or the internet. The connection can be any wired or wireless. This type of embedded system is the fastest growing area in embedded system applications. The embedded web server is a type of system wherein all embedded devices are connected to a web server and accessed and controlled by a web browser. Example for the LAN networked embedded system is a home security system wherein all sensors are connected and run on the protocol TCP/IP

Mobile Embedded Systems

Mobile embedded systems are used in portable embedded devices like cell phones, mobiles, digital cameras, mp3 players and personal digital assistants, etc. The basic limitation of these devices is the other resources and limitation of memory.

Small Scale Embedded Systems

These types of embedded systems are designed with a single 8 or 16-bit microcontroller, that may even be activated by a battery. For developing embedded software for small scale embedded systems, the main programming tools are an editor, assembler, cross assembler and integrated development environment (IDE).

Medium Scale Embedded Systems

These types of embedded systems design with a single or 16 or 32 bit microcontroller, RISCs or DSPs. These types of embedded systems have both hardware and software complexities. For developing embedded software for medium scale embedded systems, the main programming tools are C, C++, JAVA, Visual C++, RTOS, debugger, source code engineering tool, simulator and IDE.

Sophisticated Embedded Systems

These types of embedded systems have enormous hardware and software complexities, that may need ASIPs, IPs, PLAs, scalable or configurable processors. They are used for cutting-edge applications that need hardware and software Co-design and components which have to assemble in the final system.

Applications of Embedded Systems:

Embedded systems are used in different applications like automobiles, telecommunications, smart cards, missiles, satellites, computer networking and digital consumer electronics.



Applications of Embedded Systems

Embedded Systems in Automobiles and in telecommunications

- Motor and cruise control system
- Body or Engine safety
- Entertainment and multimedia in car
- E-Com and Mobile access
- Robotics in assembly line
- Wireless communication
- Mobile computing and networking

Embedded Systems in Smart Cards, Missiles and Satellites

- Security systems
- Telephone and banking
- Defense and aerospace
- Communication

Embedded Systems in Peripherals & Computer Networking

- Displays and Monitors
- Networking Systems
- Image Processing
- Network cards and printers

Embedded Systems in Consumer Electronics

- Digital Cameras
- Set top Boxes
- High Definition TVs
- DVDs

This is all about the embedded systems, types of embedded systems with their applications.