

All about Embedded systems

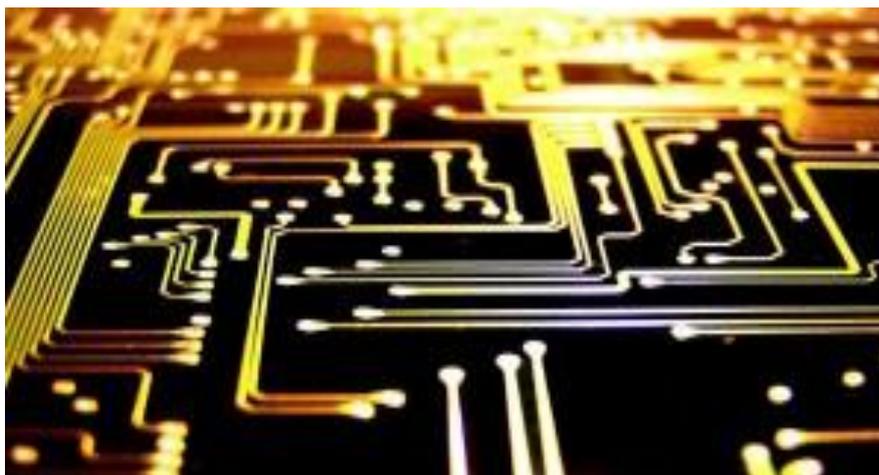


Embedded system:

An [embedded system](#) could be thought of as a [computer system](#), which has a dedicated function within a [mechanical](#) or electrical system, these come often with a [real time computing system](#). These are systems that are embedded as a part of the entire system and more often include hardware or mechanical parts. This by contrast a [general purpose computer](#) such as general purpose computers, for example a personal computer. These are designed such that they are flexible to meet the wide range of the end user products. These embedded systems control many devices in daily use now a days.

The modern day [embedded systems](#) are now based mainly on the micro controllers but still the use of ordinary microprocessors is quite common, especially in more complex systems. However in both cases the processor used for the purpose may range from general purpose computers to very specialised computers also. A common standard class of the dedicated processors

produced are Digital signal processors or DSPs.



However the key characteristic of an [embedded system](#) is however

always dedicated by the task at hand or the function that it will serve. As these are designed for specific tasks, the design engineers can optimize the product to reduce the size and improve the efficiency. These things are also produced in mass in many places. These are a bit common and help in the economy.

Now, Embedded systems physically can range from portable devices to largely complex devices. Examples of [portable devices](#) where embedded systems are used- Digital watches, Mp3 palyers, I pods. Large devices containing mechanical parts- traffic lights, factory controllers, etc.

Embedded systems are commonly found in almost all places today from consumer cooking, automotive, industrial, [medical](#), and commercial and many more. Other than them, [telecommunication systems](#) also employ embedded systems. These range from the telephone switches to network cell phones. They are also used in the routers.

Embedded systems used in consumer electronics include:

Personal Digital Assistants.

Mp3 players

GPS receivers

Printers at work and home

Amongst the household appliances the uses are:

Microwave ovens

Washing Machines

Dishwashers

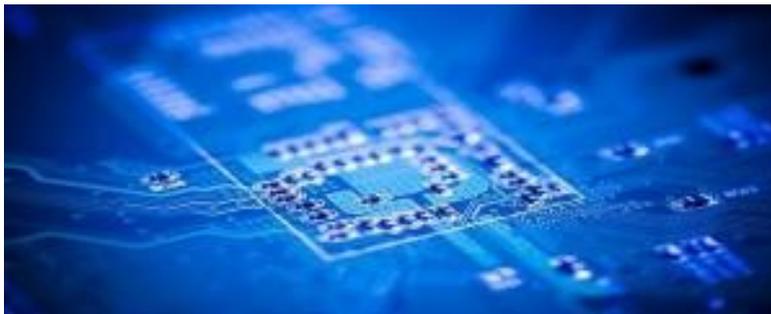
Also used In Industrial Applications in advanced HVAC systems:

This is done to more accurately control and maintain the temperature of the system and surrounding. They also use networked thermostats for more efficient control over the temperature.

Uses in Transportation systems:

They are used in advanced avionics such as the inertial guidance systems, [GPS receivers](#), and also in safety requirements.

Characteristics and design of an embedded system:



[Embedded systems](#) are designed to do some specific tasks. They are unlike general purpose computers made for

performing multiple tasks. Now, according to the definitions some of them have real time performance constraints to be met. These are mainly because of reasons such as safety and the usability. Also, there are some systems that do not have such demands to be met, thus these are normally of lower cost than the others.

Embedded systems are not always [standalone devices](#). Many of them also contain some computerized parts that installed in a bigger machine serve a more general purpose. We can look at the Gibson Robot Guitar which features embedded systems whose main motto is to turn the strings of the robot.

The [programs](#) written for burning into an embedded system is known as firmware. These are stored only in read only memory and [flash memory chips](#). One of the characteristics in that they run on very limited computer resources.

User interface used in embedded systems:

The Embedded systems may range from no user interface at all to only one user to multiple and complex graphical user interface depending upon the model and its function. The simple embedded systems use [LEDs](#) or buttons or graphical LCDs. Now, some of them use the user interface remotely with the help of a serial or network.

This approach has got many benefits:

1. It extends the capability of the embedded system
2. It avoids the cost created by installing an extra display
3. It also simplifies the BSP
4. Finally it allows a programmer to build a rich user interface on the PC.

Processors used in embedded systems:

These processors can be broken into two broad categories:

1. **Ordinary Microprocessors**: These use separate circuits for memory and peripherals.
2. **Microcontrollers**: These have on-chip peripherals, thus in turn reducing the power consumption, then also the size and cost.

Microcontrollers of many kinds and types have been developed for the embedded systems. Now, simple or general purpose microprocessors are also used in them. But these usually need a lot more circuitry than the microcontrollers. Thus microcontrollers are more favourable.

