Welcome all. Today I'm going to discuss Unit 1 ,Introduction to Embedded systems.

The various components of embedded systems and its classifications .

We are going to discuss the various components of embedded systems. Then we are going to discuss the various classification of embedded systems.Based on their performance and functional requirements and the classification of embedded systems based on complexity and performance.

At the end of the station,students will be able to learn
the various building blocks of embedded systems and will be able to classify the embedded systems according to the various categories.
The various components of embedded systems are
power supply,processor, Memory, Inputdevices, output devices,Bus,Timers, watchdog timers and communication ports.
So first we're going to discuss the first block that is power supply. Embedded system requires a maximum 5V supply or it can range from 1.8 volts. To 3.3Volts . The power supply source can be battery or can be provided by a Wall Adapter.

The second block is a processor. The processor is responsible for deciding the performance of embedded systems. The processor can be a 8-bit processor, 16 bit processor, and a 32 bit processor.

The next component is memory.The memory is classified into two categories, RAM and ROM. RAM is a random access memory, and a ROM is read only memory.

The next component is input devices, since the very embedded systems have limited capability,offer input devices, they may have the very small keypad. You press 1 key to give a specific command . Examples like in a washing machine, you will have the buttons to do a particular operation. They may not have the various options for the application to perform the task measure input.Similarly with the output devices, the Embedded systems are having very limited capability for the output, so it can have the Light Emitting

Diodes(LED) or visual indication alarms or a liquid crystal displays. As you can see, the examples for the embedded systems which are used in the washing machines. So after a particular operation it gives an alarm to indicate that a particular work has been Done.

The next component is bus.Basically, the bus is used in embedded systems to transfer and receive the data from one peripheral to another. The buses are of two types, address bus and a data bus.

The next component is timers. Timers are used to provide the delay in the application. Suppose you want to create LED Blinking applications where you need ON one LED at a time and after a certain period FF ,and then the secondLED should glow. So there should be a delay between the two LED's. For that purpose we can use the timers.

The next component is watchdog timer. If the watchdog timers are used in the embedded systems, those are useful. In case suppose there is a hardware timers that automatically generates the system reset. So if the main program neglects to periodically service it, so in this case the device hangs, since you're using the embedded systems, it cannot be restarted like your computer system. So the watchdog timer automatically. Resets the systems and resumes the work from the beginning.

The next component of embedded systems is the communication port. These are the interfaces that are used to communicate with other types of embedded systems.

Now we move on to the classification of embedded systems. The Embedded systems can be classified into two types,
one based on the performance and functional requirements and second based on the complexity and performance.
Based on the performance and functional requirements, embedded systems are classified into four types.The real time Embedded System,standalone embedded systems,
network, embedded systems, and mobile embedded systems.

And the classification of Embedded systems based on the complexity and performance can be categorized into three different types.
Small scale embedded systems
medium scale embedded systems
and the sophisticated embedded systems.

The small scale embedded systems design used for simple applications where the performance requirements are not time critical. It is built around low performance and low cost and the system design can use 8 bit or 16 bit microprocessors or microcontrollers. In this case the operating system is optional so the devices which are using a small scale embedded system may not have the operating system examples. The electronic toy.

The second the medium scale embedded systems, these medium scale embedded systems are slightly complex in hardware and software requirement, they're built around medium performance and alow cost and it can use 16 bit or 32 bit microprocessor or microcontroller or even the digital signal processor (DSP). In this case, we can use the operating system that is a general purpose operating systems or real time operating systems can be used in these applications where we are constructing the medium scale.Embedded systems. Common examples of a medium scale,embedded systems, ATM machines,the fax machine, etc.

And the third type of the embedded systems are sophisticated American systems.This embedded systems are highly complex hardware and software.Those are built around 32 bit or 16 bit. RISC processor Or a microcontroller or even system chip (SoC)or a multi core processor. They are used in mission critical applications demanding the high performance examples, smartphones,multimedia systems, etc.

The classification of an embedded system based on performance and functional requirements can be categorized into four types.
Real timeEmbedded system,
Standalone embedded system

Network embedded systems

Mobile embedded system.

The real time embedded system can be categorized into soft real time systems and hard real time systems.

In the soft real time systems the particular task has to be perform with in a Specified time, if the particular operation, cannot be performed in a specified time,the system can continue to operate, whereas in case of a hard real time operating system, the violation of the time constraints will cause critical failure and loss of life or property damage or catastrophe.

Stand on an embedded system Work by itself. It is a self contained device which do not require any host. Systems like a computer or other examples which include temperature measurement systems, MP3player, digital cameras and microwave ovens.

A third type of embedded systems are network embedded systems. Related to a network with network interfaces to access the resources .The connected network can be LAN, or WAN or the internet.The connection can be wired or wireless.Example, the home security System.

In embedded systems where we are using the web server is a type of system wherein all the embedded devices are connected to a web server and accessed and Controlled by a web browser. Example for the LAN network, embedded system is home security system wherein all sensors are connected and run on the TCP/IP protocol .

fourth type of Embedded systems are Mobile Embedded systems ,are used in the portable embedded devices like cell phones,Mobile's digital cameras, MP3 players and personal digital assistants ,etc. But the basic limitation of these devices is the other resources and limitation of memory.

At the end of the session we can conclude saying that the students must have gained knowledge Of the components of the embedded system ,students must have understood the classification of embedded systems based on a different category.

These are the references for today's session.

Thank you.