

*Unit -I***INTRODUCTION TO EMBEDDED SYSTEMS****1.3 Multitasking using an operating**

- System(OS) and Real-time operating system(RTOS), Concurrent Processes tasks or threads
- A System is composed of two or more concurrent processes that execute Operating System
- Multitasking(multiprocessing or multithreaded) software Scheduling multiple tasks,
- Processes, memory, device, ports, network, filesystem, timers, event functions, interprocessor communication, shared memory, security, GUIs, ... management

**Real Time Operating System(RTOS)**

Embedded software is most often designed for deterministic performance and task and ISR latencies in addition to the OS functions

Performing multiple actions and controlling multiple devices and their ISRs with defined real time constraints and with deadlines for these Task and ISRs priority allocations, their preemptive scheduling, OS for providing deterministic performance during concurrent processing and execution with hard (stringent) or soft timing requirements with priority allocation and pre-emption. RTOS is needed when the tasks for the system have real time constraints and deadlines for finishing the tasks

**Important RTOS es**

- OS  $\mu$  COS-II
- V x Works
- Windows CE
- OSEK
- Linux 2.6.24 or RTLinux
- QNX

So Development Tools software tools

1. Editor,
2. Interpreter,
3. Compiler,
4. Assembler and Cross Assembler, IDE,
5. Proto type

### *Application Software Development Tools*

- Source Code Engineering Tools
- Stethoscope (tracks the switching from one task to another as a function of time, stores beats)
- Trace Scope (traces changes in a parameter (s) as a function of time)

### *Simulator*

A Simulator used to simulate the target processor and hardware elements on a host PC and to run and test the executable module.

### *Project Manager*

To manage the files that associate with a design stage project and keep several versions of the source file(s) in an orderly fashion.

## **EXAMPLES OF EMBEDDED SYSTEMS**

### **Examples**

- Telecom
- Smartcards,
- Missiles and Satellites,
- Computer Networking,
- Digital Consumer Electronics, and
- Automotive

### *Applications*

- Mobile phone
- Digital camera
- Rob Point
- Automatic Chocolate Vending Machine

- Stepper motor controllers for a robotics system
- Washing or cooking system
- Multitasking Toys
- Microcontroller-based single or multi-  
display digital panel meter for voltage, current, resistance and frequency
- Keyboard controller
- Serial port cards
- CD drive or Hard Disk drive controller
- Peripheral controllers,, a CRT display controller, a keyboard controller, a DRAM controller, a DMA controller, a printer controller,
- A laser printer-controller, a LAN controller, a disk drive controller
- Fax or photocopy or printer or scanner Machine Remote(controller) of TV
- Telephone with memory, display and other sophisticated features
- Motor controls Systems-for examples, an accurate control of speed and position of  
dc. motor, robot ,and CNC machine; ,the automotive applications like such as a  
close loop engine control ,a dynamic ride control ,and an anti-lock braking system monitor
- Electronic data acquisition and supervisory control system Spectrum analyzer
- Biomedical systems-for example, an ECG LCD display-cum-recorder, a blood-cell recorder cum analyzer and a patient monitor system service.

OBSERVE OPTIMIZE OUTSPREAD