

Evaluation Policy

**L-T-P-C: 3-0-3-4

Assessment- 65:35	Internal -65	External -35
Mid Term Exam	20	
Continuous Assessment Theory (CAT)	15	
Continuous Assessment Lab (CAL)	30	
End Semester Exam		35

Continuous Evaluation Theory -15%

- ➤ 3 Assignment + Class Note Submission 7%
- ▶2 Class Test 8% (written exam)

≻Continuous Evaluation Lab -30%

- ➤ Group Project 10%
- ► Lab sheets -5% (based on submission)
- ➤ 2 Internal Exam + Viva 15% (P1-5%+P2-10%)

End Semester Exam-35%

Text Book(s)

- 1. Furber SB. ARM system-on-chip architecture. pearson Education; 2000.
- 2. Martin T. The Insider's guide to the Philips ARM7-based microcontrollers. Coventry, Hitex, UK, Ltd. 2005.

Reference(s)

- 1. Valvano JW. Embedded Systems: Introduction to ARM Cortex-M Microcontrollers.
- 2. Jonathan W. Valvano; 2016. Valvano JW. Embedded microcomputer systems: real time interfacing. Cengage Learning; 2012
- 3. https://courses.edx.org/courses/course-v1:UTAustinX+UT.6.10x+1T2017/course/
- 4. https://courses.edx.org/courses/course-v1:UTAustinX+UT.6.20x+2T2018/course/

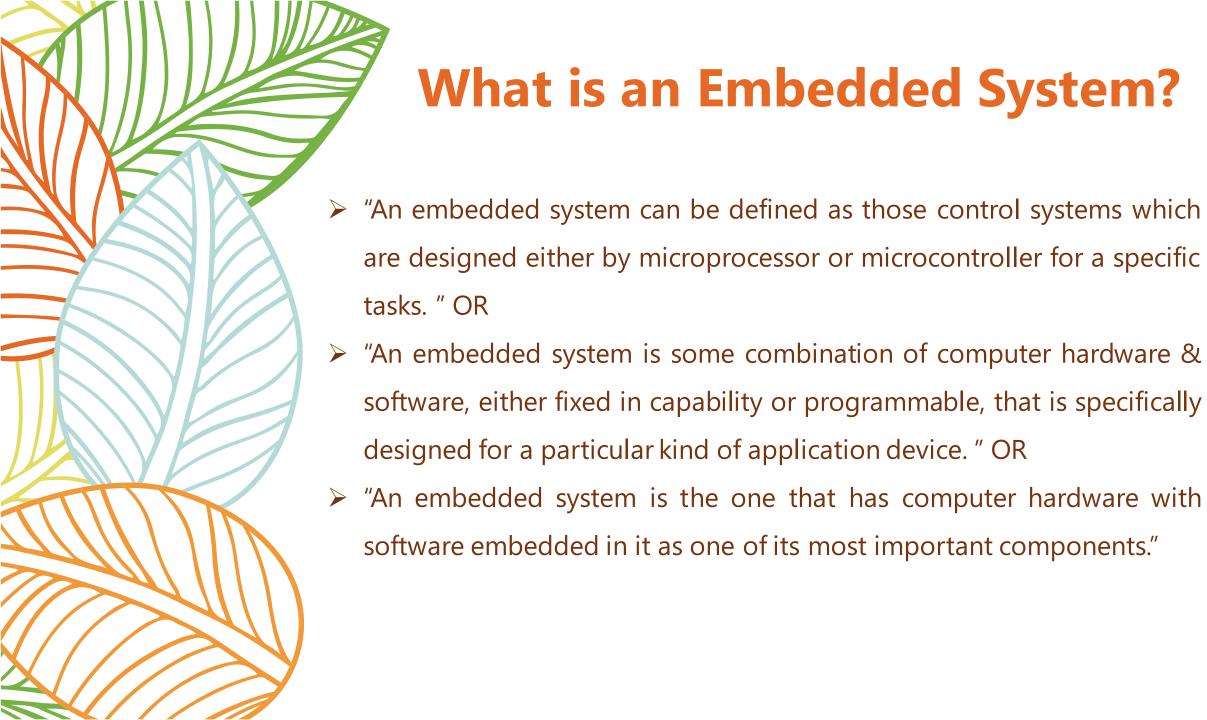


Definition

- Embed:
 - to enclose closely in a surrounding mass.
- System: implicitly a controlling system.
 - > **System:** Anything which accepts input, processes it and presents the output in the required format can be a system.

Embedded systems (ES) = information processing systems embedded into a larger product

It is more than a Computer, It is a "Complete System"





A "short list" of embedded systems

Anti-lock brakes Auto-focus cameras Automatic teller machines

Automatic toll systems Automatic transmission

Avionic systems Battery chargers Camcorders Cell phones

Cell-phone base stations

Cordless phones Cruise control

Curbside check-in systems

Digital cameras Disk drives

Electronic card readers Electronic instruments

Electronic toys/games Factory control

Fax machines

Fingerprint identifiers

Home security systems Life-support systems

Life-support systems Medical testing systems Modems

MPEG decoders

Network cards

Network switches/routers On-board navigation

Pagers

Photocopiers

Point-of-sale systems

Portable video games

Printers

Satellite phones

Scanners

Smart ovens/dishwashers

Speech recognizers Stereo systems

Teleconferencing systems

Televisions

Temperature controllers Theft tracking systems TV set-top boxes

VCR's, DVD players Video game consoles

Video phones

Washers and dryers

















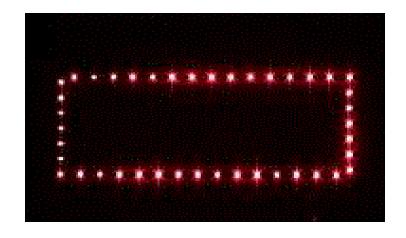




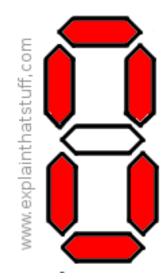




Embedded System Daily Applications



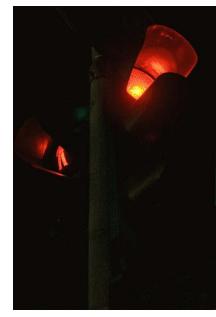
Moving message display



7 segment display



Digital clock

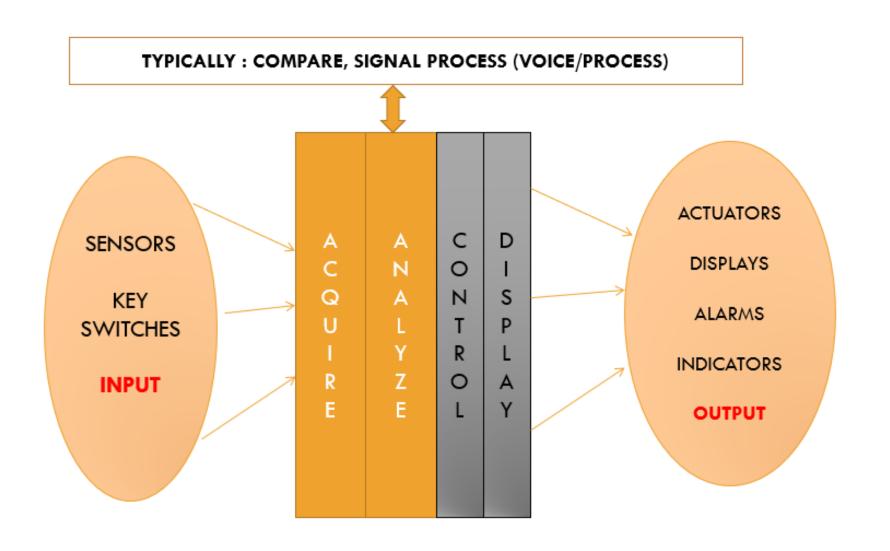


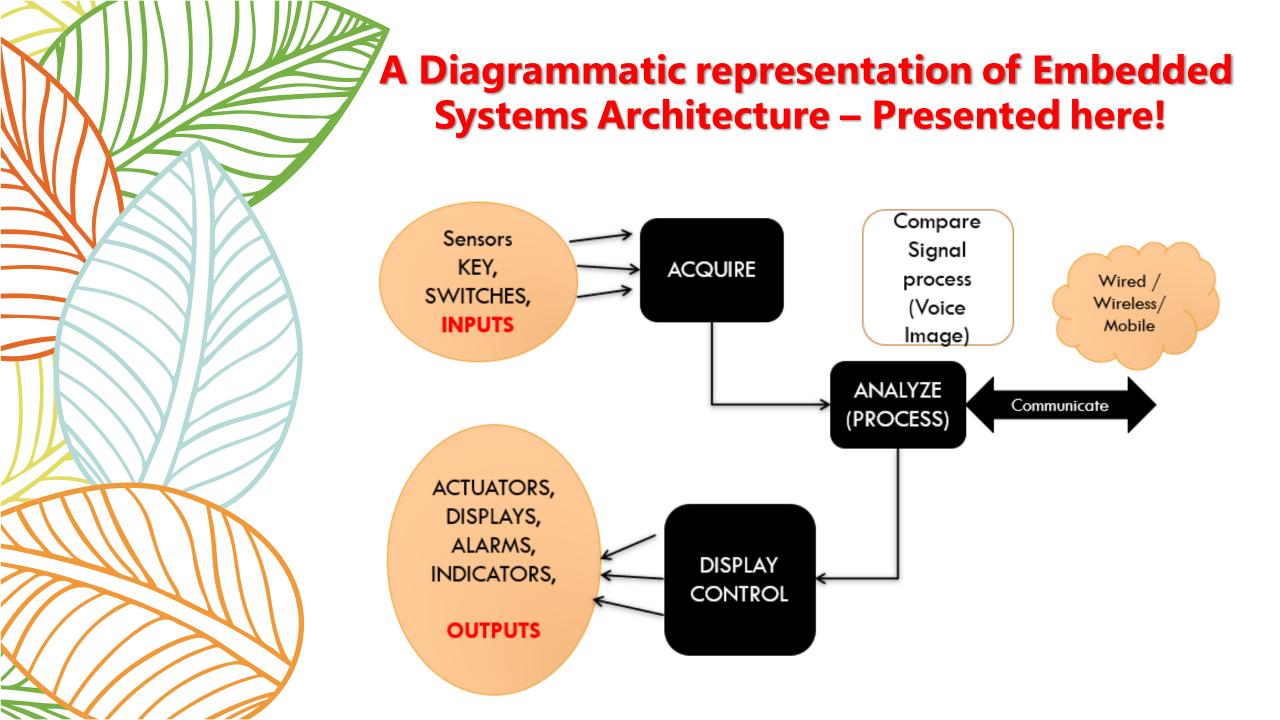
Traffic Light

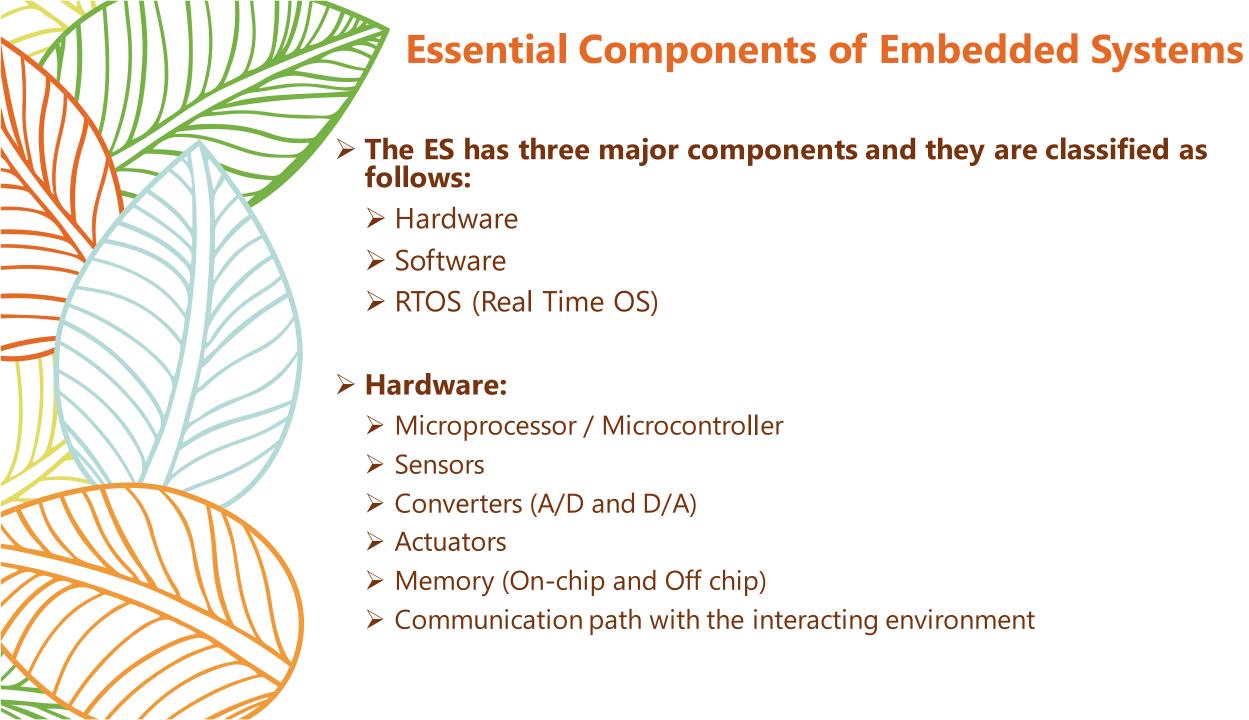




A Diagrammatic representation of Embedded Systems Architecture – Presented here!







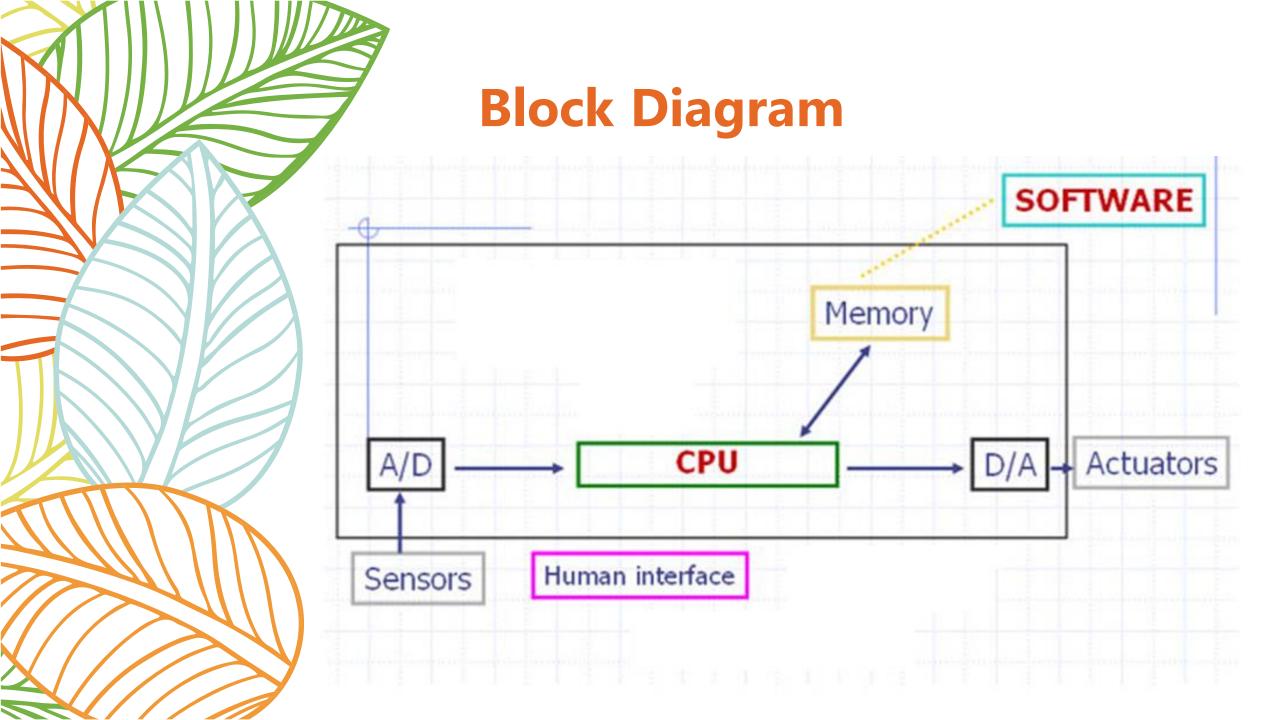


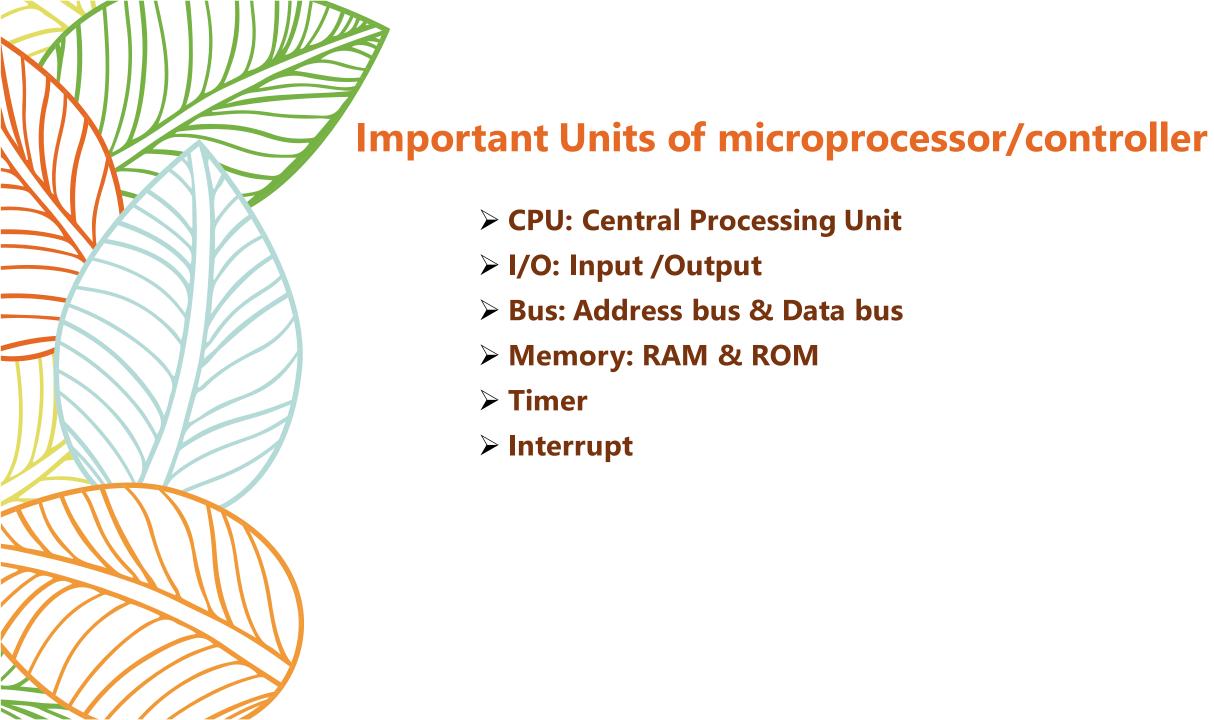
Software:

> Application software that can perform a series of task.

> RTOS:

- Defines the way the system works
- Supervises the application software
- Provides a mechanism to let the processor to run a process as per scheduling (Process scheduling)
- Perform Context switching between the processes

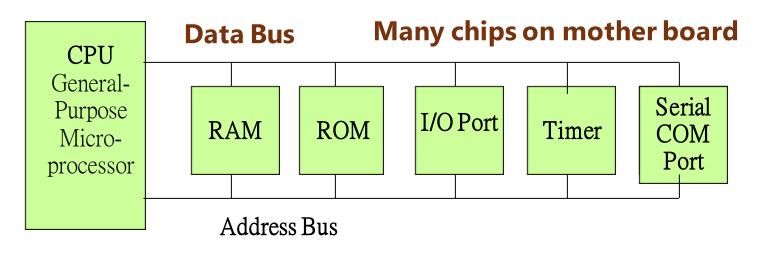






Microprocessor

- **➤** General-purpose microprocessor
- > CPU for Computers
- ➤ No RAM, ROM, I/O on CPU chip itself
- > Example--Intel's x86: 8086,8088,80386,80486, Pentium



General-Purpose Microprocessor System



Microcontroller

- > A smaller computer.
- ➤ On-chip RAM, ROM, I/O ports...
- > Example:- Motorola's 6811, Intel's 8051 and PIC 16X

	CPU	RAM	ROM	
I	[/O Po1	Timer	Serial COM Port	

A single chip



Microcontroller



Microprocessor v/s Microcontroller

Microprocessor

- CPU is stand-alone, RAM, ROM, I/O, timer are separate
- ➤ Designer can decide on the amount of ROM, RAM and I/O ports.
- **Expensive**
- **≻** General-purpose
- > Examples:-
 - > 8085,8086 microprocessors
 - ➤ Motorola6800,
 - > Intel's 8086, etc.

Microcontroller

- > CPU, RAM, ROM, I/O and timer are all on a single chip
- Fixed amount of on-chip ROM, RAM, I/O ports
- ➤ For applications in which cost, power and space are critical
- > Single-purpose
- > Examples:-
 - **>** 8051,
 - > PIC mc,
 - > Motorola
 - > MC's, Phillips, etc.



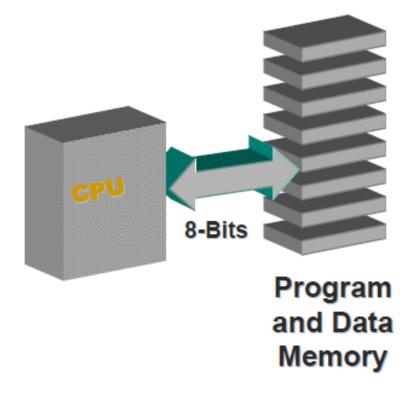
Main Architecture

- ➤ Embedded processors are constructed into 2 main architecture
 - > Von Neumann
 - > Harvard



Von Neumann Architecture

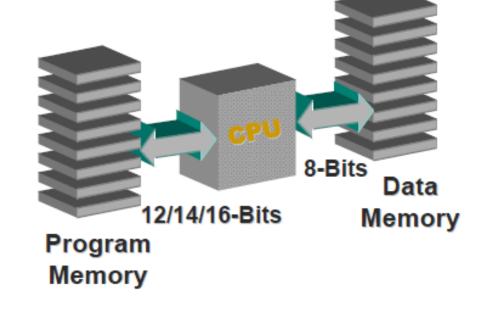
- > Fetches instructions and data from same memory
- >Limits operating bandwidth





Harvard Architecture

- > Two separate memory spaces for instruction and data
- >Increases throughput
- ➤ Different program and data bus widths are possible





Thank You