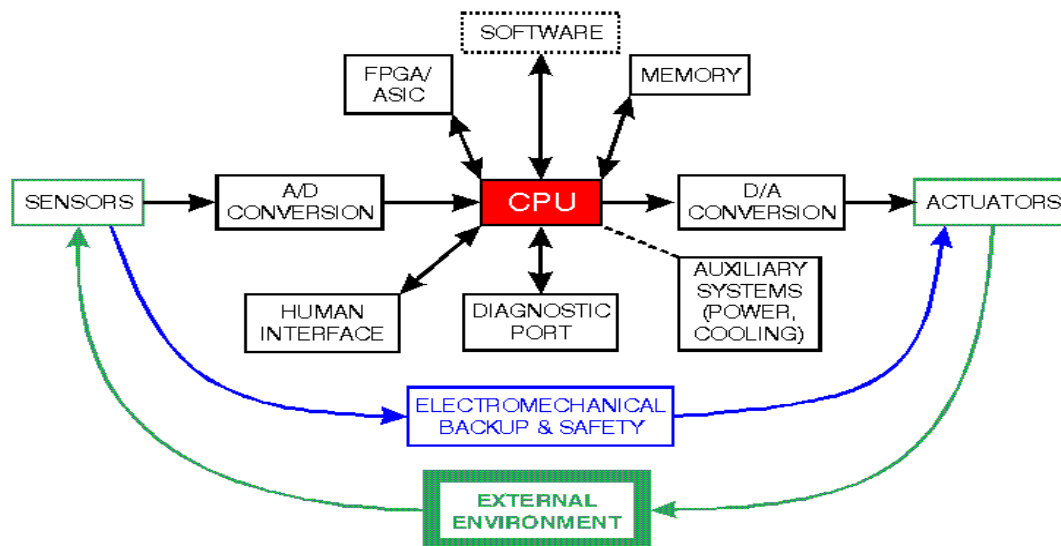


EMBEDDED SYSTEM

An embedded system is a special-purpose computer system, which is completely encapsulated by the device it controls. An embedded system has specific requirements and performs pre-defined tasks, unlike a general-purpose personal computer.



An embedded system is a programmed hardware device. A programmable hardware chip is the 'raw material' and it is programmed with particular applications. This is to be understood in comparison to older systems with full functional hardware or systems with general purpose hardware and externally loaded software. Embedded systems are a combination of hardware and software which facilitates mass production and variety of application



A combination of computer hardware and software, and perhaps additional mechanical or other parts, designed to perform a dedicated function.

In some cases, embedded systems are part of a larger system or product, as in the case of an anti lock braking system in a car.

- * EMBEDDED SYSTEM is a combination of SOFTWARE and HARDWARE.
- * An Embedded system is a system, that has a computing device embedded into it.
- * These are the controllers, processors, arrays or other hardware using dedicated (embedded) logic or programming (code) called “firmware” or a “microkernel
- * Embedded systems are designed around a μ C which integrates Memory & Peripherals

WHY EMBEDDED SYSTEMS

It is EMBEDDED because the Micro Controller is ‘inside’ some other system.
For Example a Micro Controller is ‘EMBEDDED’ into your TV, car, or appliance
The consumer need not think about how to make it perform or process

- * Avoids lots of Electronics Components
- * Built in rich Features
- * Reduces the cost, space
- * Less Down Time for Maintenance
- * Probability of Failure is reduced
- * Easy interface with Computers

CHARACTERISTICS OF AN EMBEDDED SYSTEM

- Sophisticated functionality
- Real-Time Operation
- Low Manufacturing Cost
- Low Power Consumption
- Eliminates Necessity of Complex Circuitry
- Smarter Products
- Smaller Size
- User Friendly
- State of the Art Technology

Four General Embedded Systems Types

General Computing

- Applications similar to desktop computing, but in an embedded package
- Video games, set-top boxes, wearable computers, automatic tellers

Control Systems

- Closed-loop feedback control of real-time system
- Vehicle engines, chemical processes, nuclear power, flight control

Signal Processing

- Computations involving large data streams
- Radar, Sonar, video compression

Communication & Networking

- Switching and information transmission
- Telephone system, Internet

FEATURES OF AN EMBEDDED SYSTEM

Real-Time Operation

- Reactive: computations must occur in response to external events
- Correctness is partially a function of time

Small Size, Low Weight

- Hand-held electronics and Transportation applications -- weight costs money

Low Power

- Battery power for 8+ hours (laptops often last only 2 hours)

Harsh environment

- Heat, vibration, shock, power fluctuations, RF interference, lightning, corrosion

Safety-critical operation

- Must function correctly and Must not function in correctly

Extreme cost sensitivity

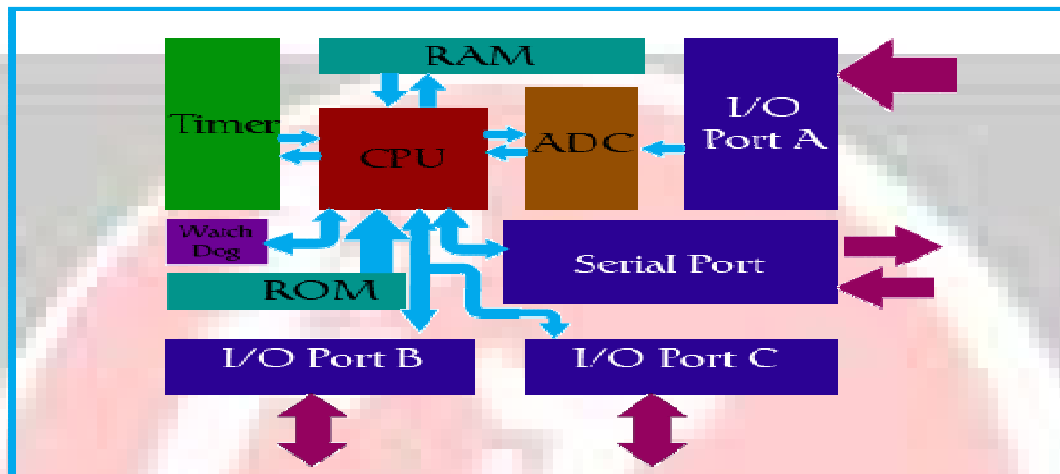
EMBEDDED SYSTEMS COMPONENTS

- * MICRO CONTROLLERS (μ C)
- * MICRO PROCESSORS (μ P)
- * DIGITAL SIGNAL CONTROLLERS (DSC)
- * DIGITAL SIGNAL PROCESSORS (DSP)
- * BUSSES (Data, Address, Input/output)
- * SYSTEM CLOCK - Steps μ C / μ P Through Each Instruction
- * READ ONLY MEMORY (ROM): Permanently Loaded With Instructions (FIRMWARE)
- * RANDOM ACCESS MEMORY (RAM)
- * STORES DATA IN PROCESSING / SHARES DATA WITH EXTERNAL PARTNERS
- * REAL TIME CLOCK (RTC)
- * COMMUNICATIONS CIRCUITRY - Ethernet Port, Printer Port, Communications Port (RS232c, RS485, RS422, IEEE488)

TYPICAL EMBEDDED SYSTEM HARDWARE

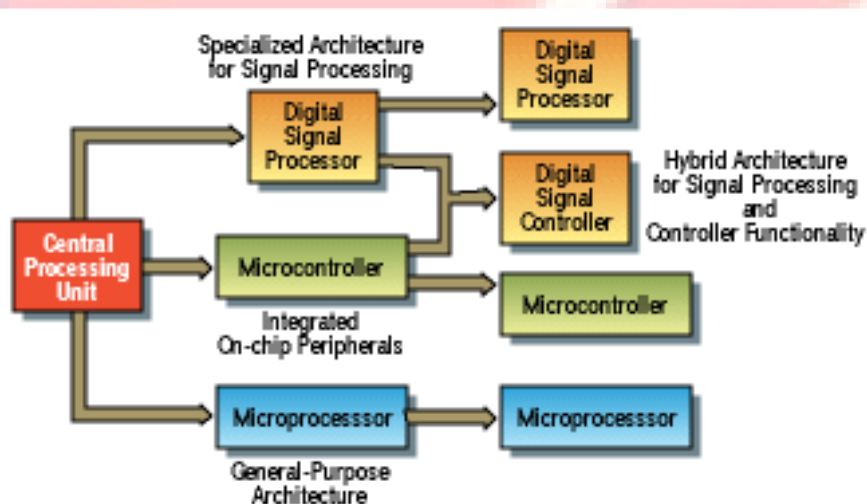
- COMMERCIAL OFF-THE-SHELF COMPONENTS (COTS)
e.g. wireless radios, sensors, I/O devices, –Cheap
- APPLICATION-SPECIFIC ICs (ASICs)
ICs tailored to meet application needs, Good performance for their intended task(s), Original Ess were ASICs only
- DOMAIN-SPECIFIC PROCESSORS
- DSPs
- Microcontrollers
- Digital Signal Controllers
- Microprocessors

MICROCONTROLLERS



- Microcontroller is a highly integrated chip that contains all the components comprising a controller.
- Typically, this includes a CPU, RAM, some form of ROM, I/O ports, and timers. A Microcontroller is designed for a very specific task – to control a particular system.
- As a result, the parts can be simplified and reduced, which cuts down on production costs
- Atmel, Microchip – PIC, Maxim, Motorola

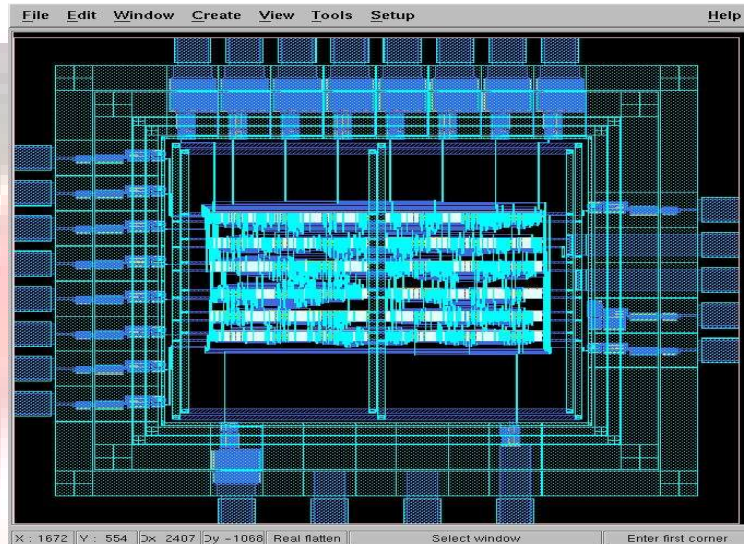
DIGITAL SIGNAL CONTROLLERS



- The Digital Signal Controller (DSC) is a powerful 16-bit (data) modified Harvard RISC machine that combines the control advantages of a high performance 16-bit Microcontroller (MCU) with the high computation speed of a fully implemented digital signal processor (DSP) to produce a tightly

coupled single-chip single-instruction stream solution for embedded systems design.

VLSI



- Very large-scale integration, the process of placing thousands (or hundreds of thousands) of electronic components on a single chip.
- Nearly all modern chips employ VLSI architectures, or ULSI (ultra large scale integration)
- Altera, Cypress, Cirrus Logic, Xilinx

TYPES OF MICRO CONTROLLER

More than 140 Types of Micro Controllers Available

Some of the examples are ..,

- Microchip – PIC, dsPIC, rfPIC
- Atmel – AVR, ARM, 89cxx
- Analog Devices
- Texas Instruments
- ST Microcontrollers
- Zilog, Cypress, Maxim, Dallas, Motorola, etc.,



Contact : Mobile no. 9975948726

Website : embeddedjunkyard.webs.com

Email: embeddedjunkyard@gmail.com