Microcontroller and Embedded Systems

A/D Converter

Oscillator 0 - 40MHz

Microprocessor

RAM

Program Memory

Oscillator 0 - 40MHz

SPI I²C

USART

T0 T1 T2 T3

RAM

PLL

Serial Communication

Timers

CPU

Program Memory

A/D Converter

CCP1

CCP2

Vref

CCP/PWM Modules

Interrupts

WDT

EEPROM

Memory

I/O Ports

Port A

Port B

Port C

Port D

Port E

RESET

Power Supply 2 - 5.5V
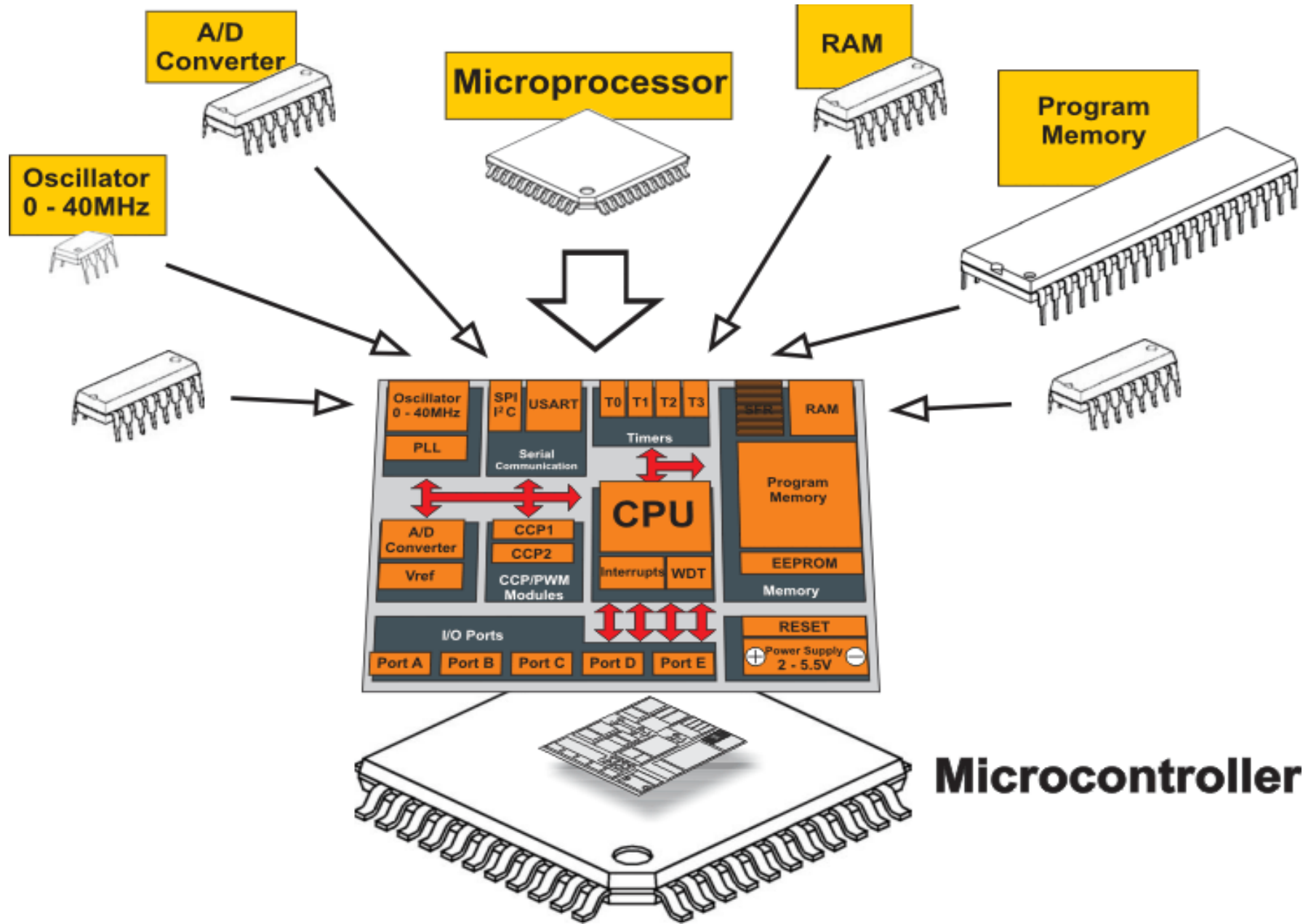
Microcontroller

What is an Embedded System

- **Dedicated to one task**
- **All h/w required is available on single chip**
- **Interacts with physical elements (Pressure, temp.) for measuring, controlling.**

An Embedded System is a **microprocessor/microcontroller based system that is embedded as a subsystem, in a larger system** *(which may or may not be a computer system).*
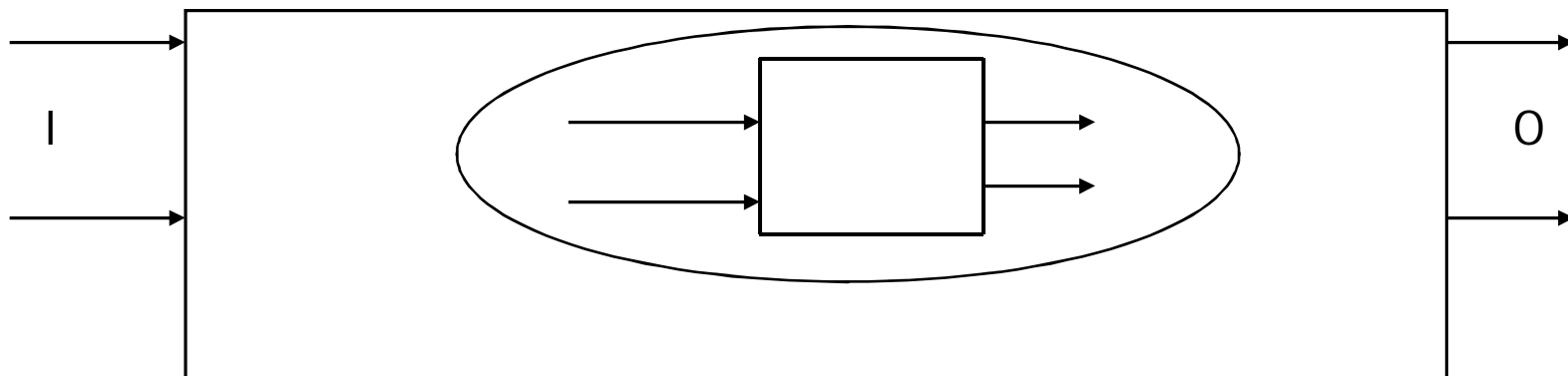
What is an Embedded System

- Embedded system means the **processor is embedded** into that application.

- An embedded product uses a **microprocessor or microcontroller to do one task only.**

- In an embedded system, there is **only one application software** that is typically burned into ROM.

- **Example** ：printer, keyboard, video game player, microwave oven, etc.
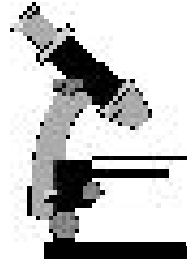
Application areas

- Automotive electronics

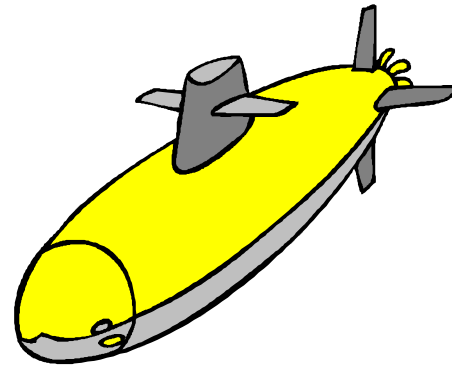- Aircraft electronics

- Trains

- Telecommunication
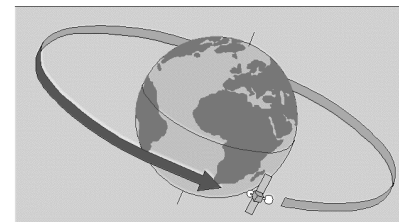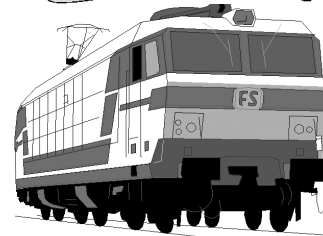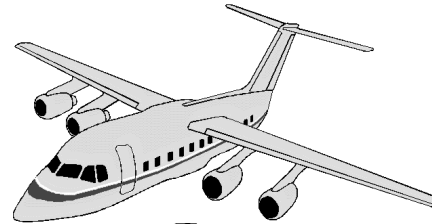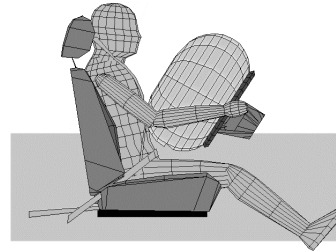
Application areas
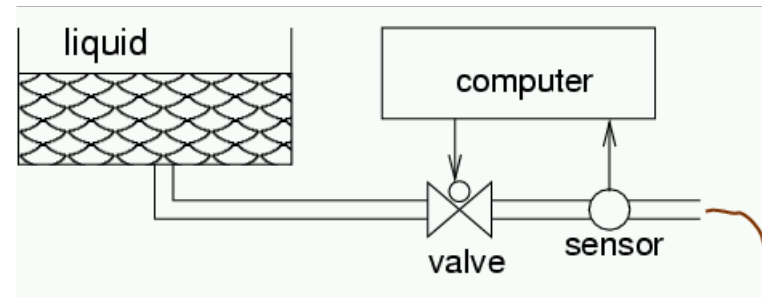
- Medical systems

- Military applications

- Authentication

Application areas

- Consumer electronics

- Fabrication equipment

- Smart buildings

Essential Components

- Microprocessor / DSP

- Sensors

- Converters (A-D and D-A)

- Actuators

- Memory (On-chip and Off chip)

- Communication path with the interacting environment