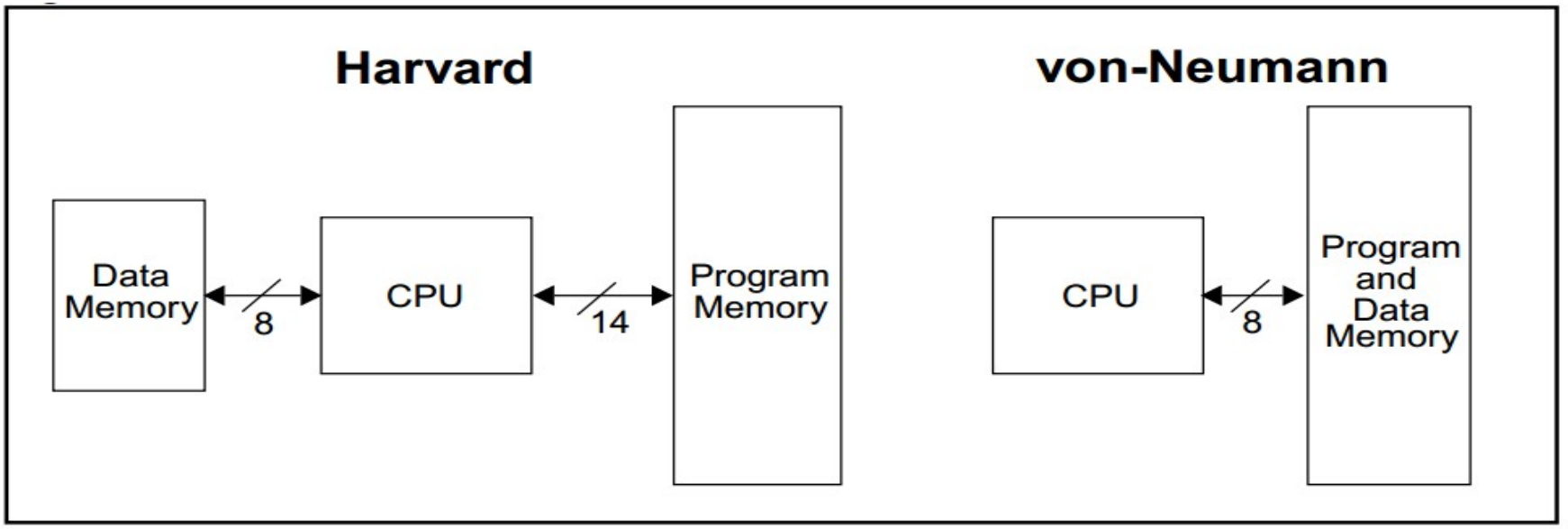
CSE3023.1 & 2: Computer Interfacing

AVR MCU Overview

Lecture 1

Harvard vs. von Neumann architecture



- Watch the flash presentation

Microcontroller

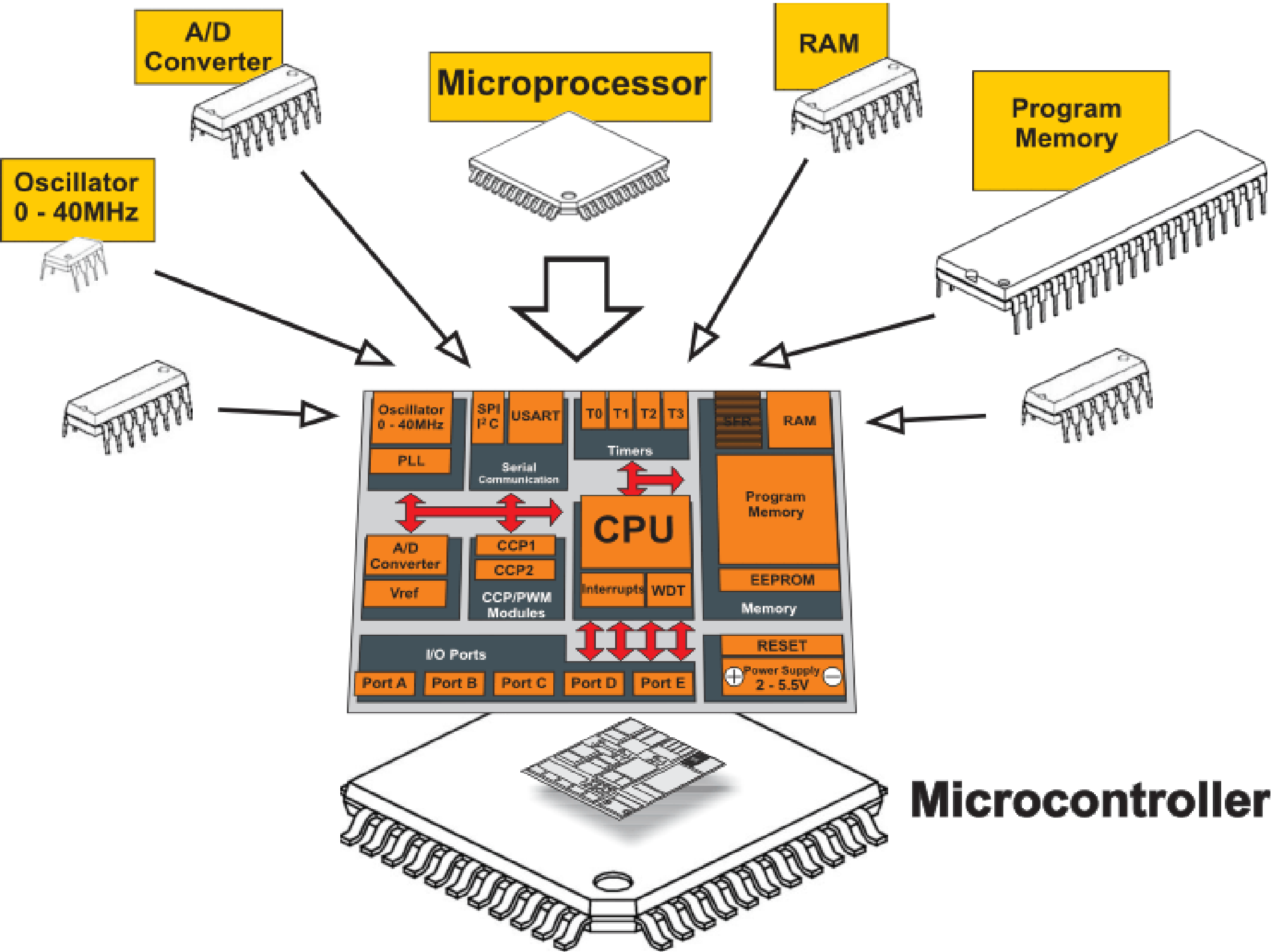
Microcontrollers, as the name suggests, are small controllers.

A microcontroller (sometimes abbreviated µC, uC or MCU) is a small computer on a single integrated circuit containing at least one processor core, memory, and programmable input/output peripherals.

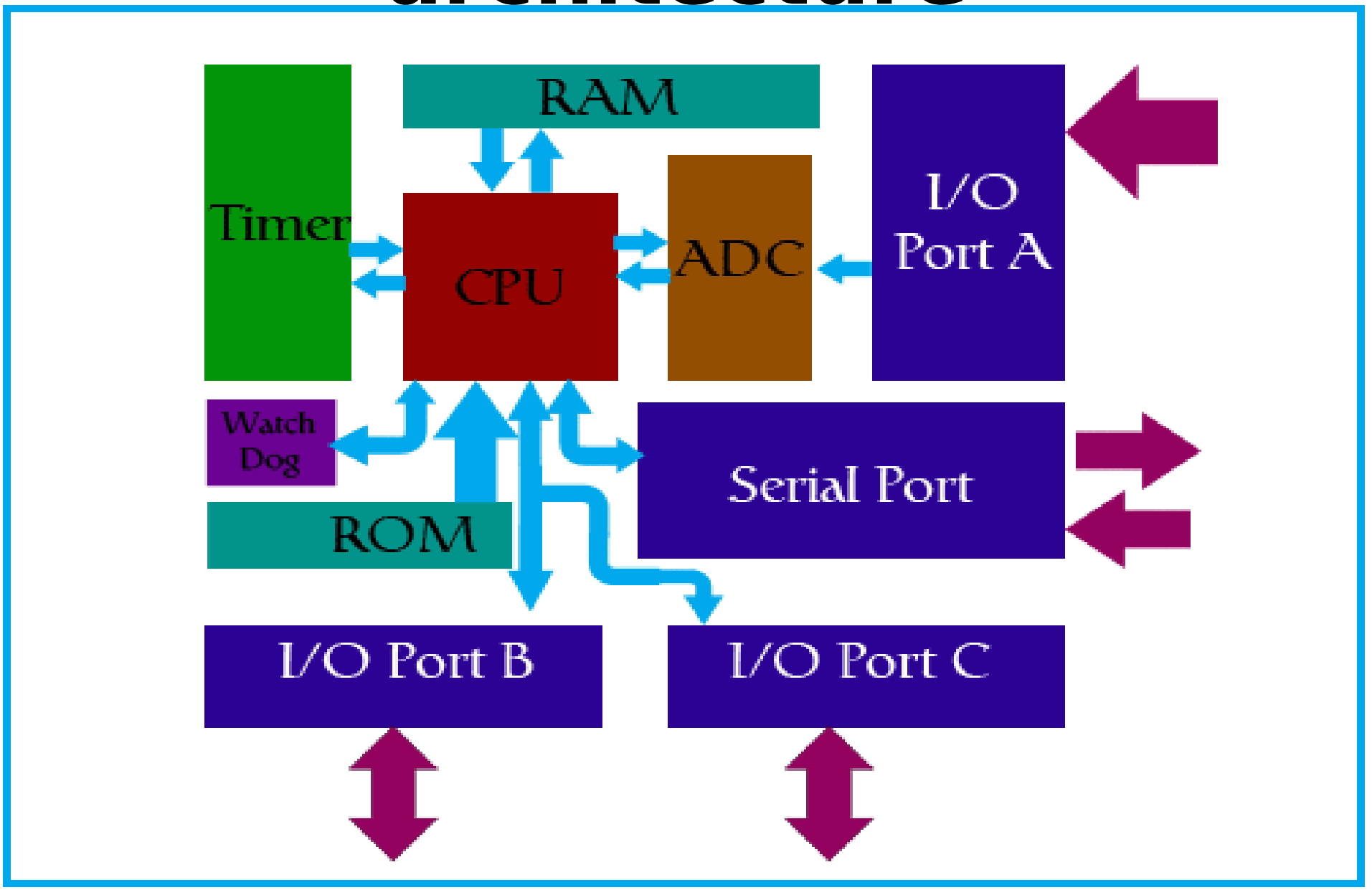
Microcontrollers vs. Microprocessors:

In order for a microprocessor to be used, other components such as memory, or components for receiving and sending data must be added to it.

Microcontroller is designed to be all of that in one. No other external components are needed for its application because all necessary peripherals are already built into it.


A/D Converter
Microprocessor
RAM
Program Memory
Oscillator 0 - 40MHz
Oscillator 0 - 40MHz
PLL
SPI I² C
USART
Serial Communication
T0
T1
T2
T3
Timers
SFR
RAM
CPU
Program Memory
A/D Converter
Vref
CCP1
CCP2
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

Basic microcontroller architecture



Different MCUs

- 8bit RISC : Microchip PIC, Atmel AVR Atmega/ tiny etc.
- 8bit CISC : Intel 8051, Freescale (formally Motorola)
- 32 bit MCU : AVR 32 , PIC 32, ARM Cortex (most popular)
- There are also 16 bit architecture...

The MCU for this course

- AVR Atmega 328P
- Why...why not??
- Features go through Page 1 of the new **bible** for this course...
- www.avrfreaks.net

Atmega 328P Capabilities

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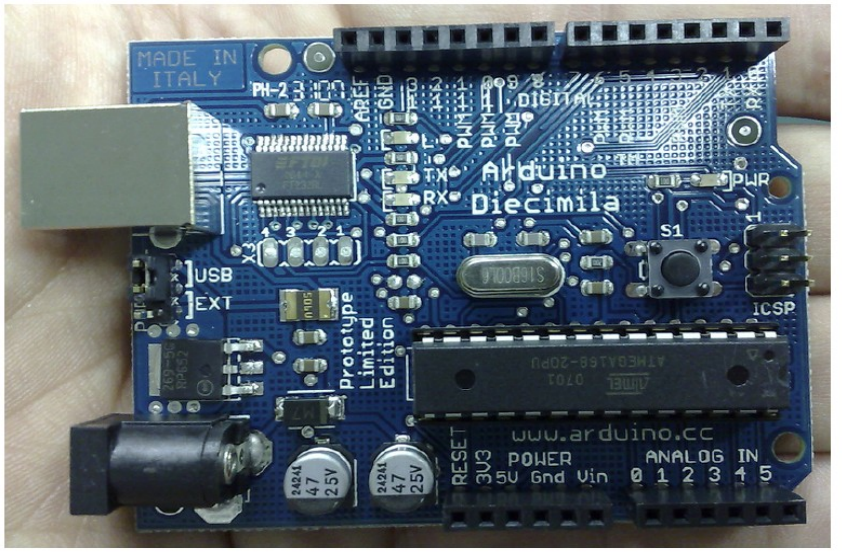
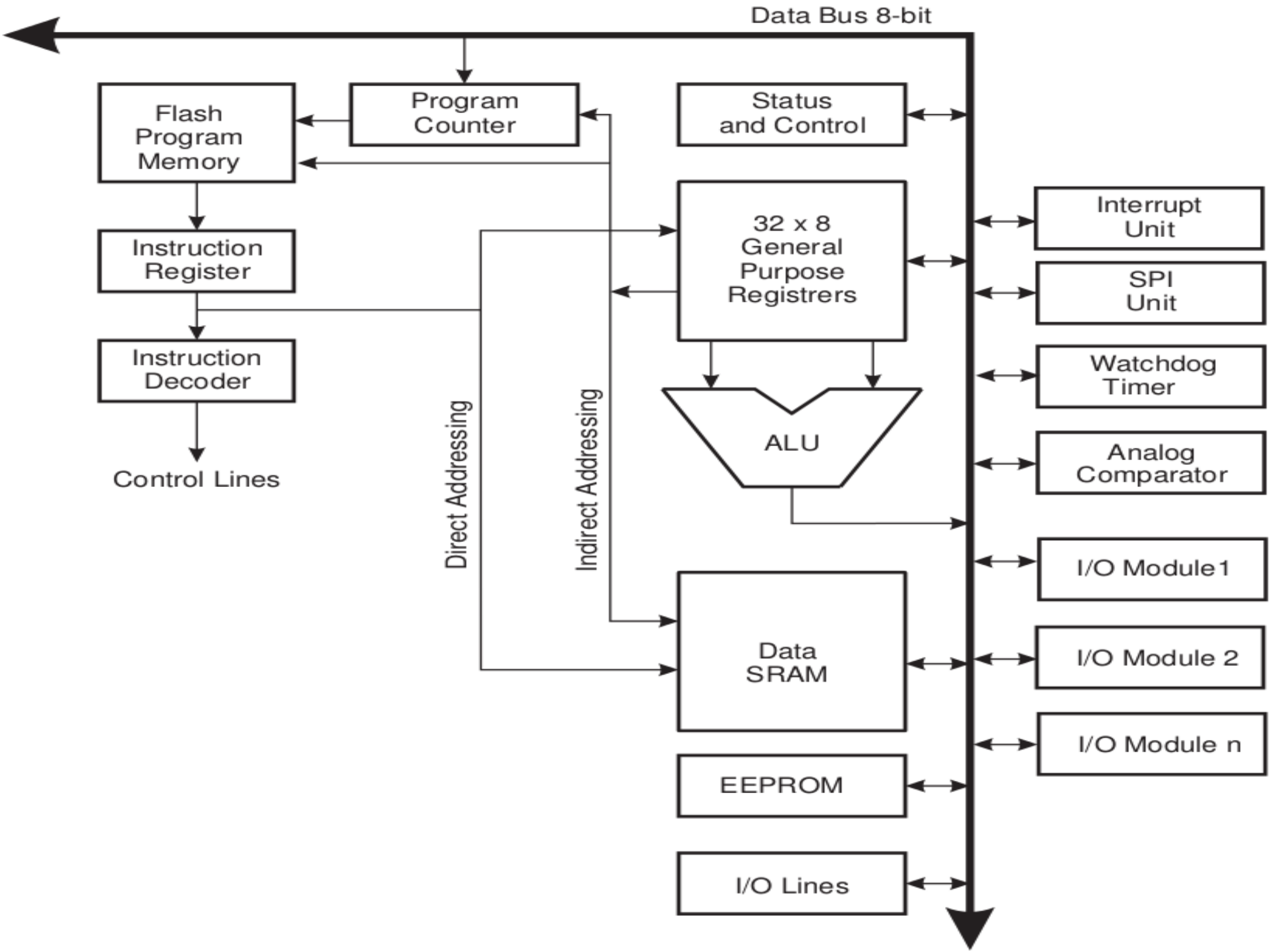


Intel 286

Atmega 328P


Data Bus 8-bit
Flash Program Memory
Program Counter
Status and Control
Instruction Register
Instruction Decoder
Control Lines
32 x 8 General Purpose Registrers
ALU
Direct Addressing
Indirect Addressing
Data SRAM
EEPROM
I/O Lines
Interrupt Unit
SPI Unit
Watchdog Timer
Analog Comparator
I/O Module1
I/O Module 2
I/O Module n