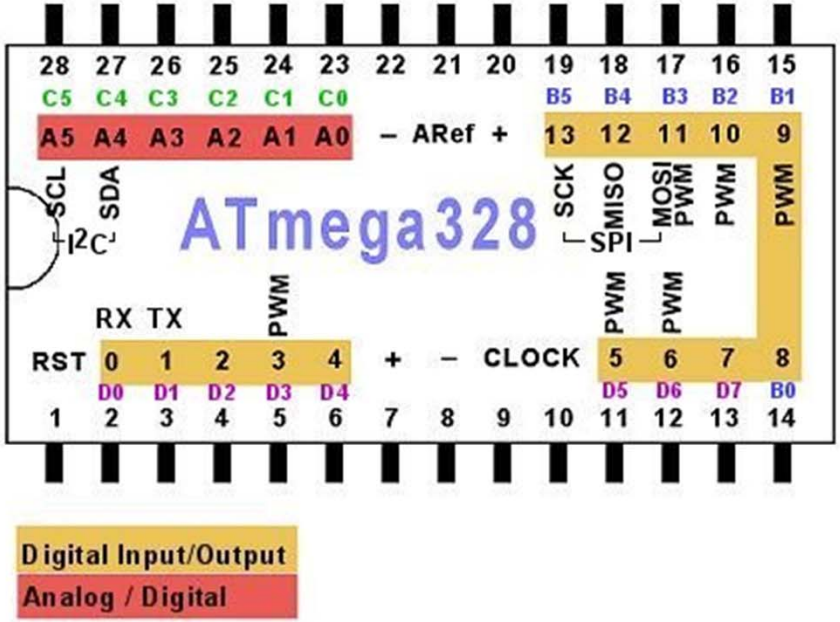
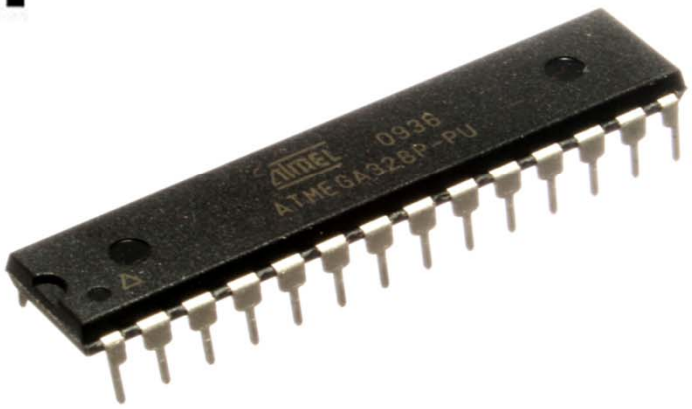
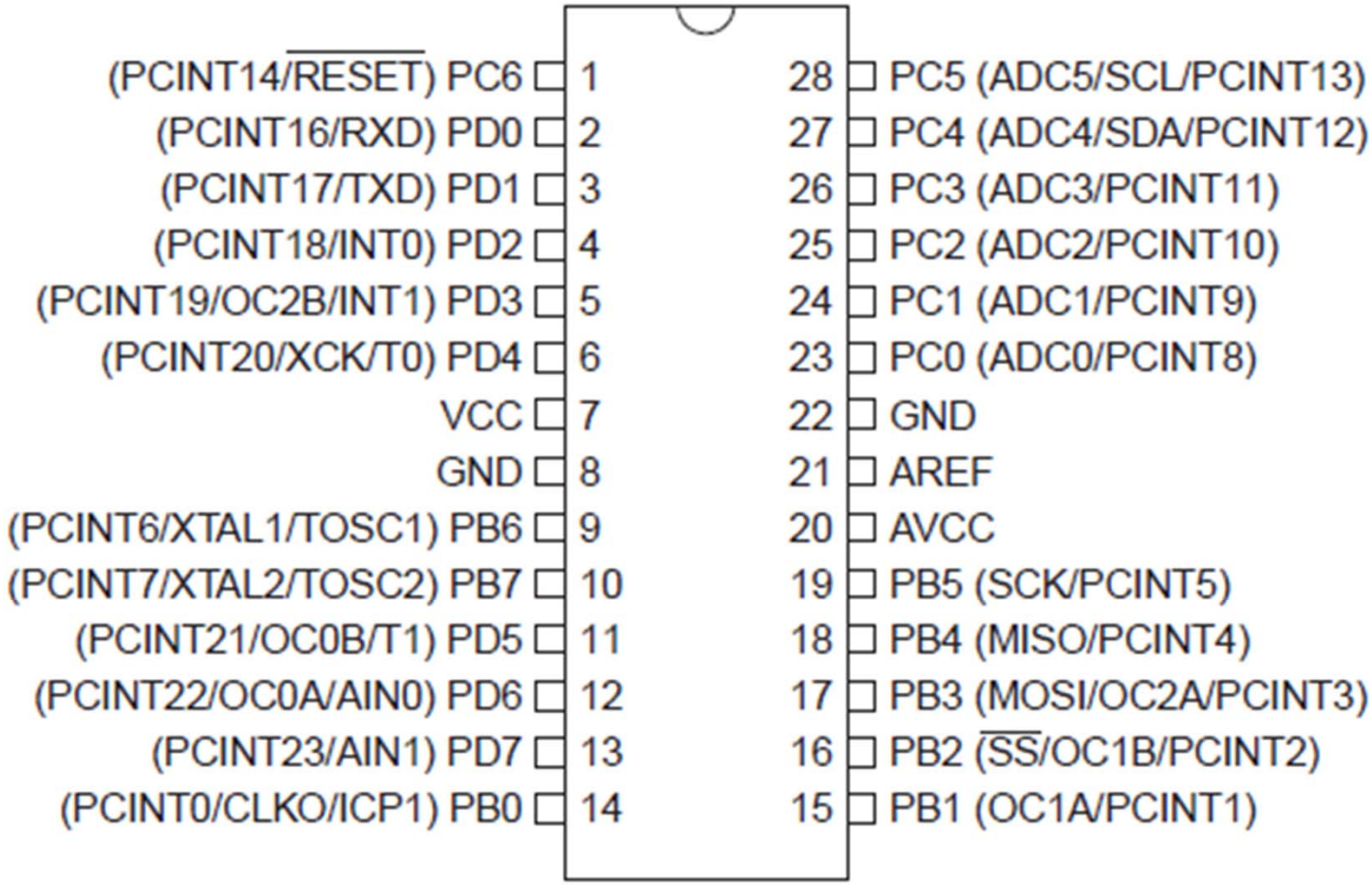
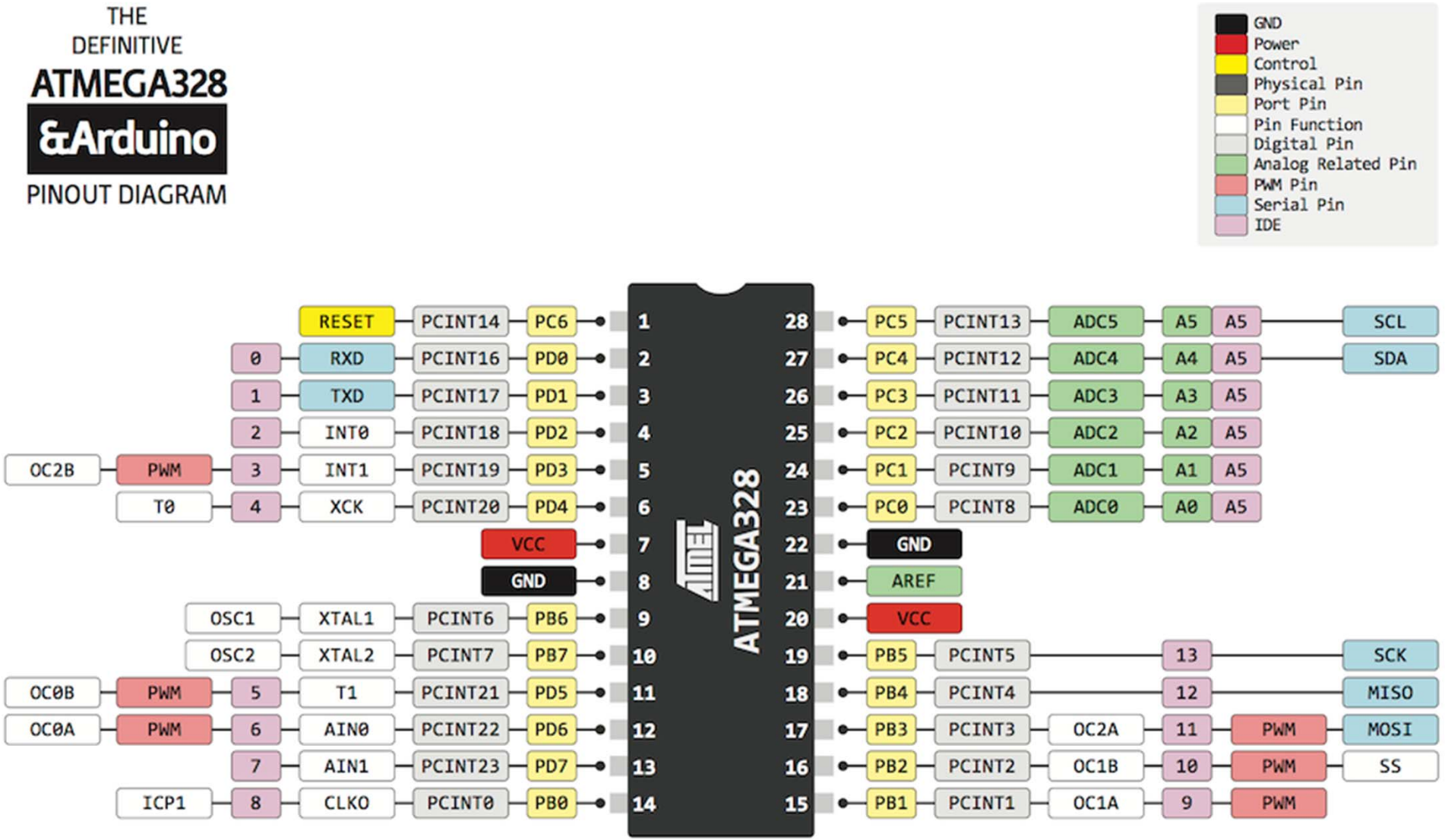
Knowing ATmega328






(PCINT14/RESET) PC6 1
(PCINT16/RXD) PD0 2
(PCINT17/TXD) PD1 3
(PCINT18/INT0) PD2 4
(PCINT19/OC2B/INT1) PD3 5
(PCINT20/XCK/T0) PD4 6
VCC 7
GND 8
(PCINT6/XTAL1/TOSC1) PB6 9
(PCINT7/XTAL2/TOSC2) PB7 10
(PCINT21/OC0B/T1) PD5 11
(PCINT22/OC0A/AIN0) PD6 12
(PCINT23/AIN1) PD7 13
(PCINT0/CLKO/ICP1) PB0 14
28 PC5 (ADC5/SCL/PCINT13)
27 PC4 (ADC4/SDA/PCINT12)
26 PC3 (ADC3/PCINT11)
25 PC2 (ADC2/PCINT10)
24 PC1 (ADC1/PCINT9)
23 PC0 (ADC0/PCINT8)
22 GND
21 AREF
20 AVCC
19 PB5 (SCK/PCINT5)
18 PB4 (MISO/PCINT4)
17 PB3 (MOSI/OC2A/PCINT3)
16 PB2 (SS/OC1B/PCINT2)
15 PB1 (OC1A/PCINT1)

THE
DEFINITIVE
ATMEGA328
&Arduino
PINOUT DIAGRAM



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18 FEB 2013
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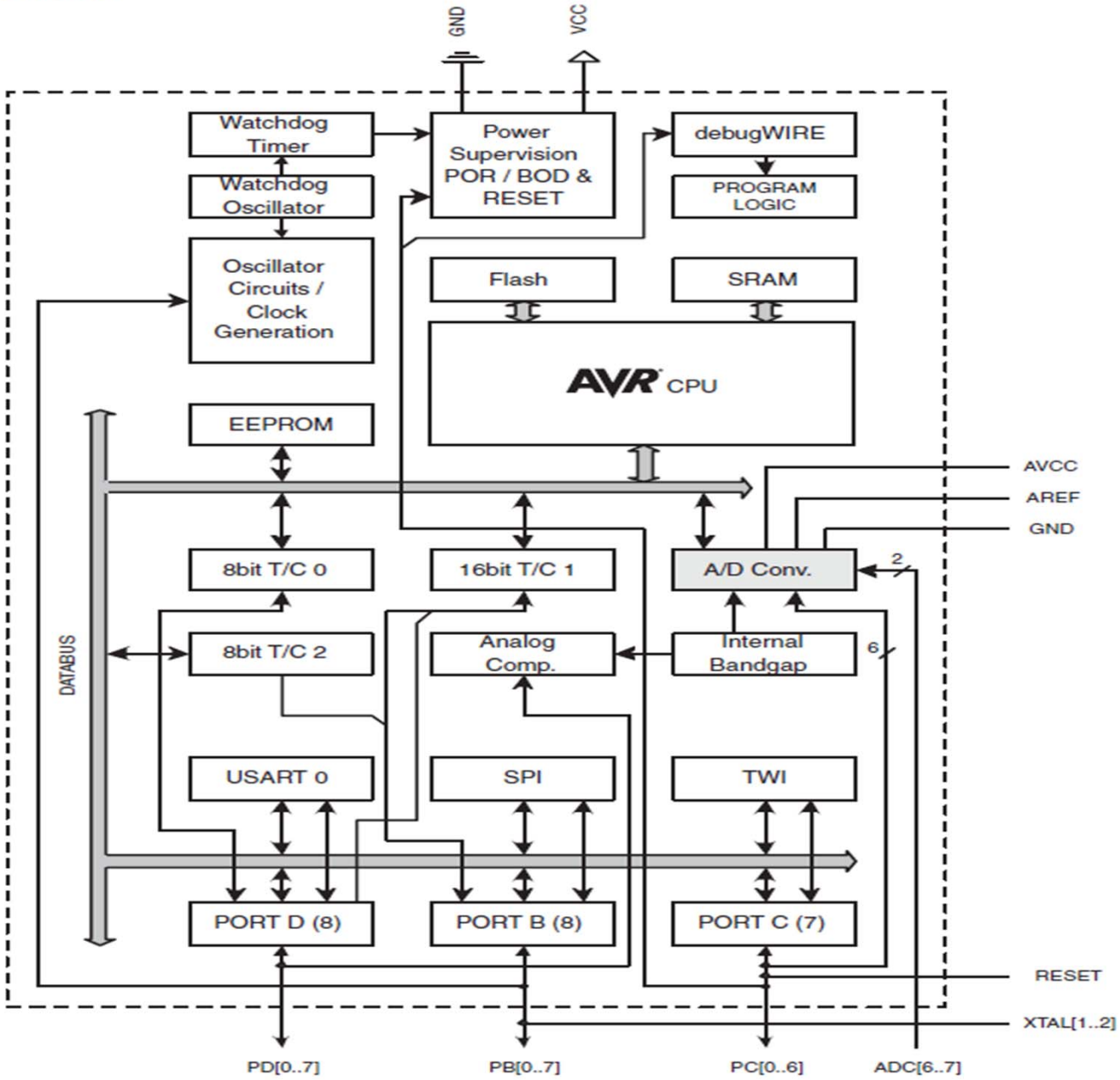
ATmega328P pin mapping

Arduino function						Arduino function	
reset		PC6	1	28	PC5		analog input 5
digital pin 0	RX	PD0	2	27	PC4		analog input 4
digital pin 1	TX	PD1	3	26	PC3		analog input 3
digital pin 2		PD2	4	25	PC2		analog input 2
digital pin 3	PWM	PD3	5	24	PC1		analog input 1
digital pin 4		PD4	6	23	PC0		analog input 0
VCC		VCC	7	22	GND		GND
GND		GND	8	21	AREF		analog reference
crystal		PB6	9	20	AVCC		AVCC
crystal		PB7	10	19	PB5	SCK	digital pin 13
digital pin 5	PWM	PD5	11	18	PB4	MISO	digital pin 12
digital pin 6	PWM	PD6	12	17	PB3	MOSI PWM	digital pin 11
digital pin 7		PD7	13	16	PB2	PWM	digital pin 10
digital pin 8		PB0	14	15	PB1	PWM	digital pin 9

When using ISP to program the chip

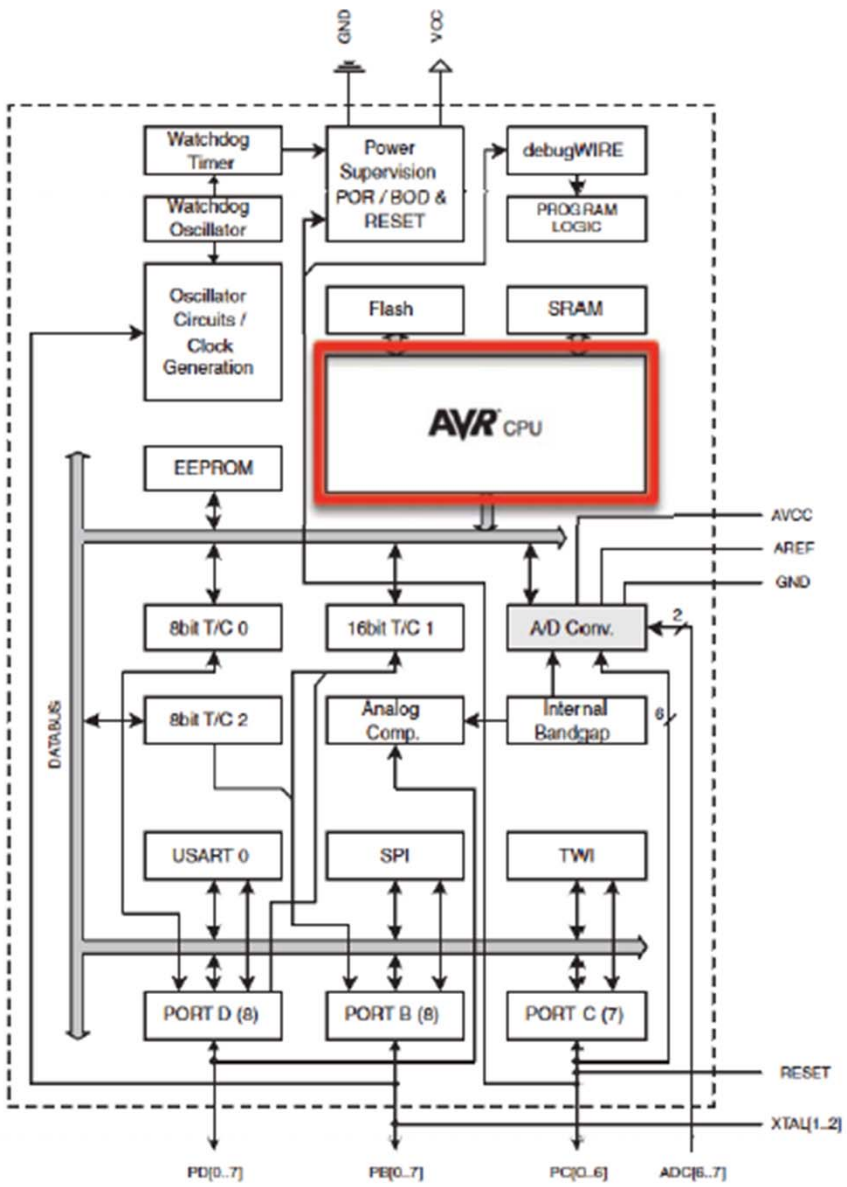
Block Diagram

Figure 2-1. Block Diagram



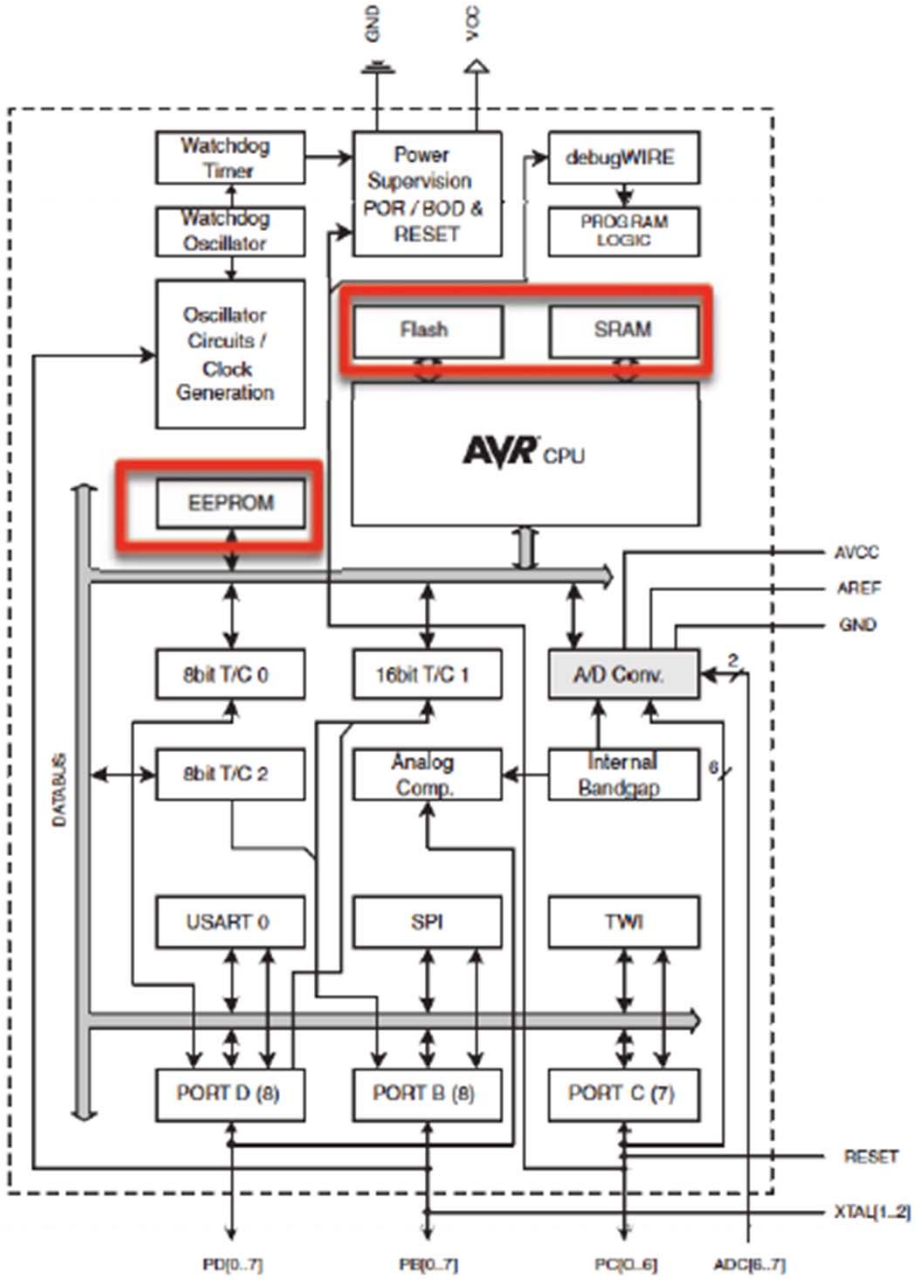
AVR Architecture

- CPU
  - Details coming



AVR Architecture

- Harvard architecture
- Flash – program memory
  - 32K
- SRAM – data memory
  - 2K
- EEPROM
  - For long-term data
  - On I/O data bus

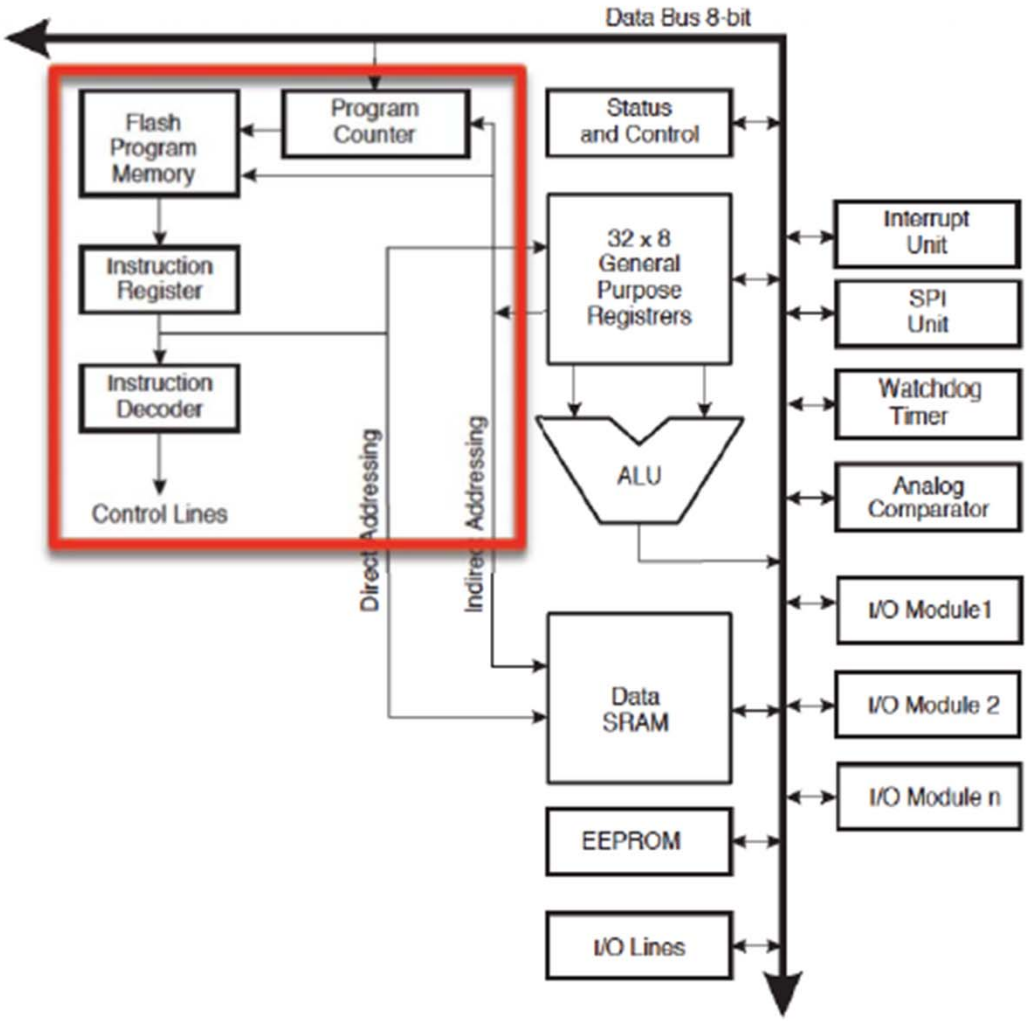


Memory

- Flash (32K) (15-bit addresses)
  - Program memory – read only
  - Non-volatile
  - Allocate data to Flash using PROGMEM keyword
    - see documentation
- SRAM (2K)
  - Temporary values, stack, etc.
  - Volatile
  - Limited space!
- EEPROM (1K)
  - Long-term data
  - see documentation on EEPROM library

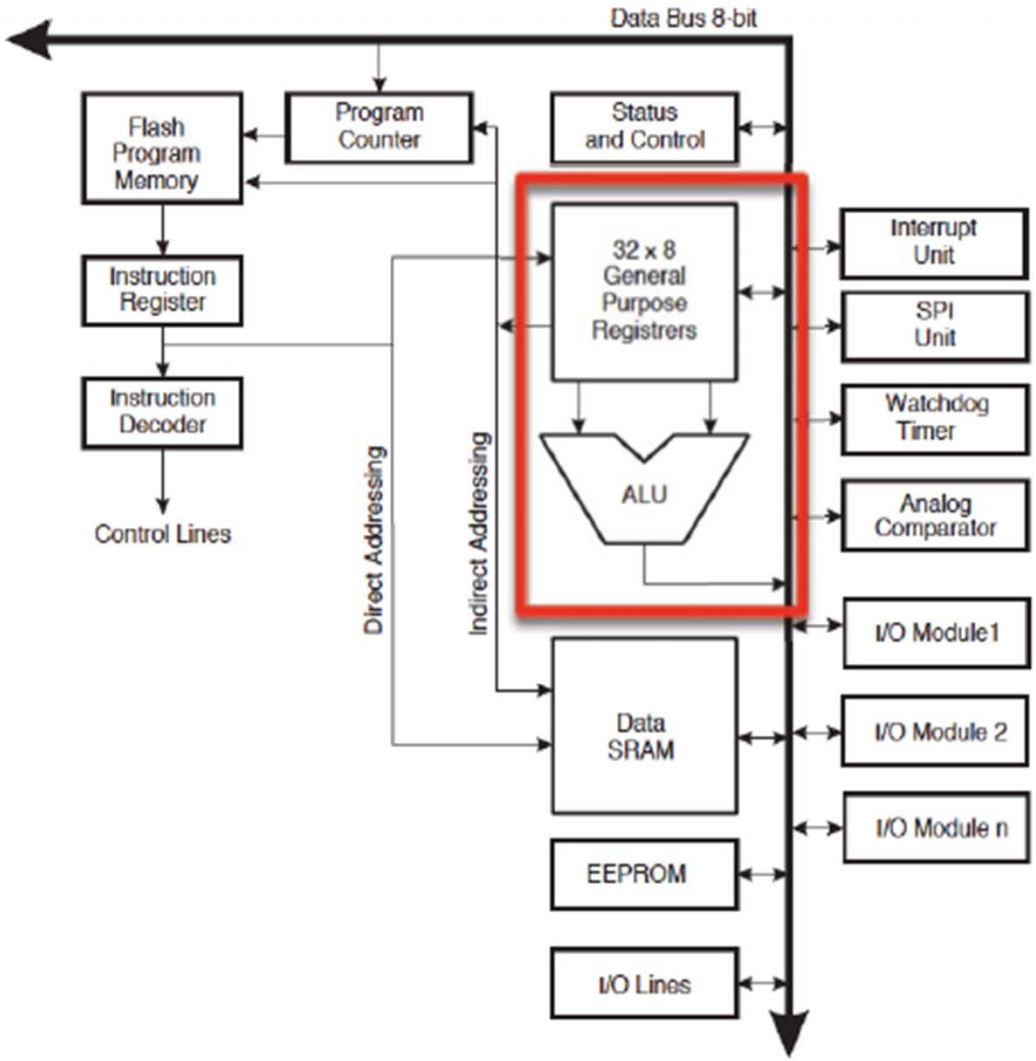
AVR CPU

- Instruction Fetch and Decode



AVR CPU

- ALU Instructions



AVR CPU

- I/O and special functions