Microcontroller, Computer Peripherals and Interfacing

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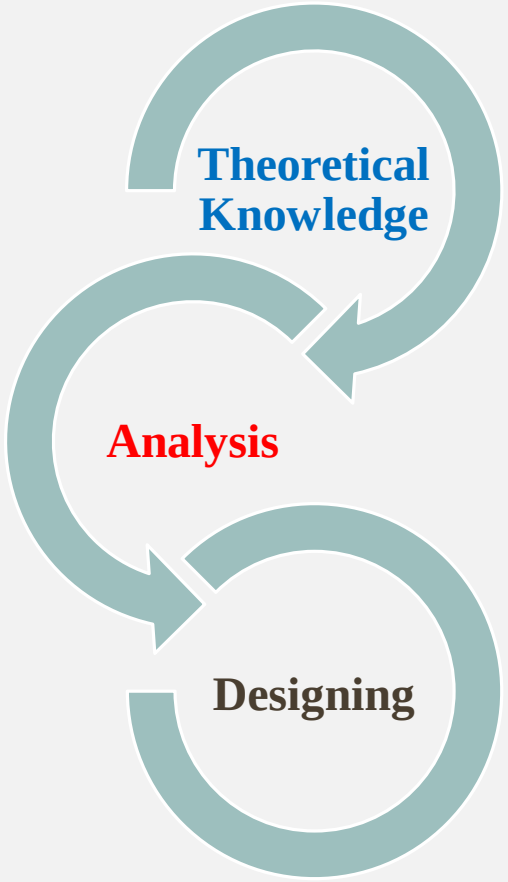
Course Introduction

- Course Code CSE 425
- Microcontroller
- Study of Embedded system
- Programming
- Computer Peripherals
- Interfacing
- Protocols

Course Planning



Course Objectives

- Learning Microcontroller
- Learning Programming for Microcontroller
- Learning enough to plan about a Project
- Making a Device
- Learning how to Program a specific Device
- Running your OWNMADE device

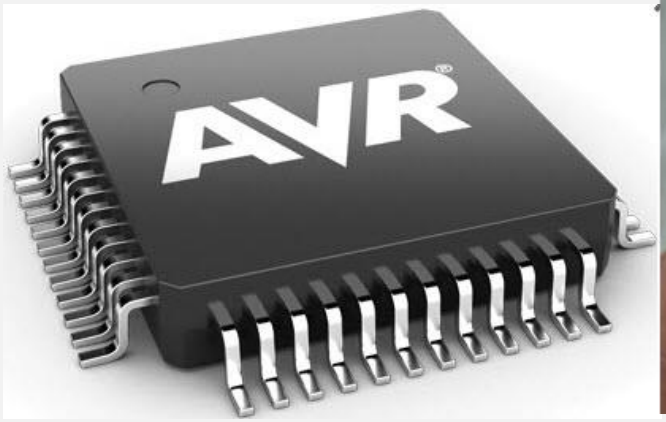
Microcontroller Introduction

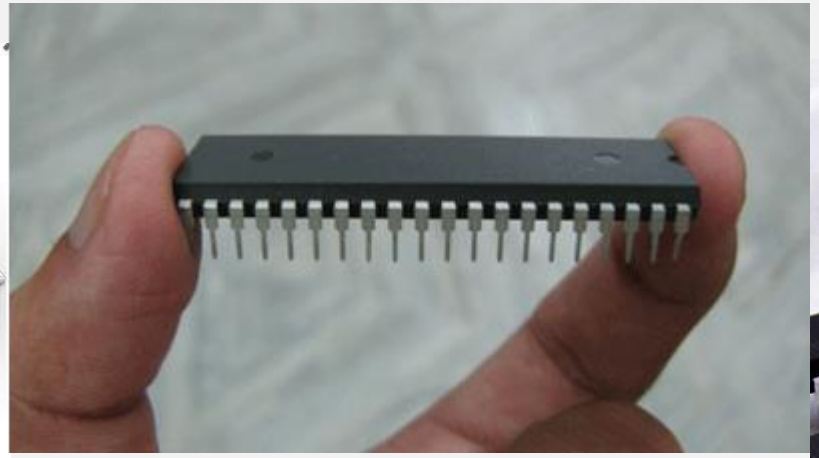
So where do microcontrollers are founded, right?

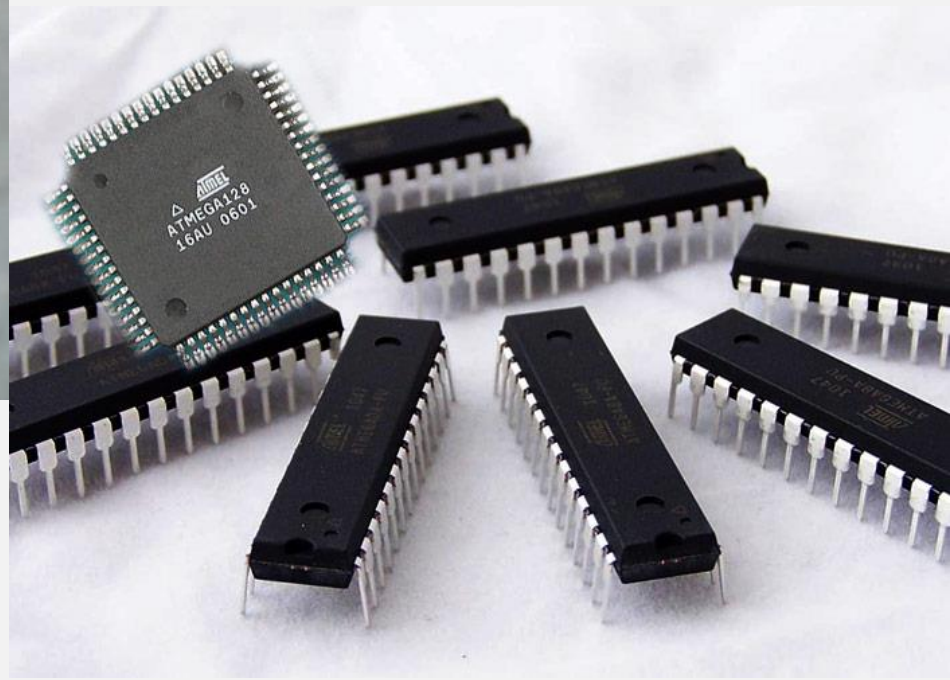
Would you believe that each one of you is using at least 20 microcontrollers in your house??!!

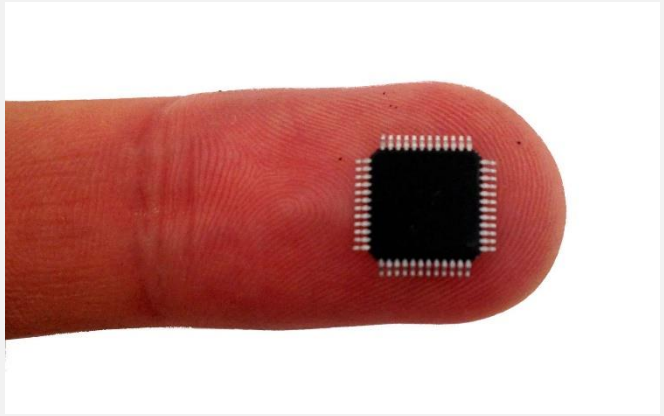
Some Example of Microcontroller Based Devices

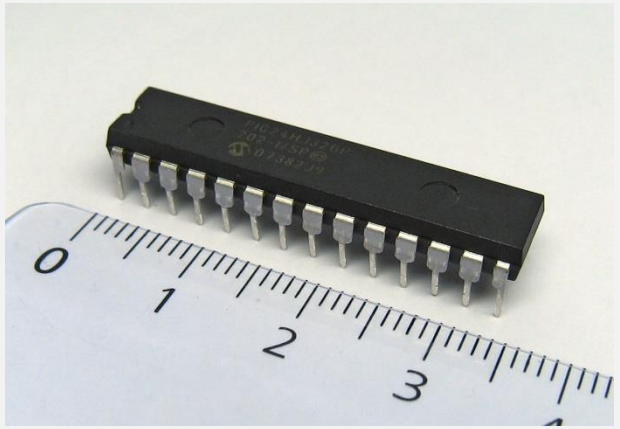
How Does A Microcontroller Look Like?

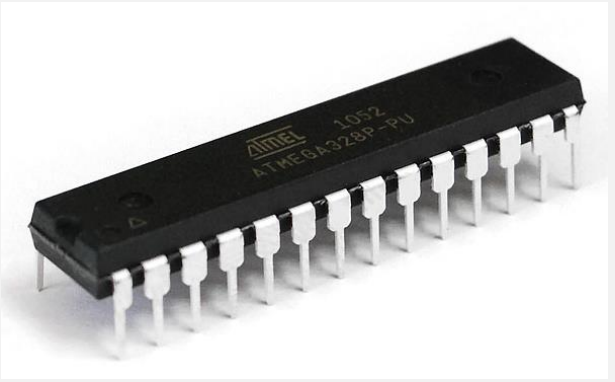

AVR



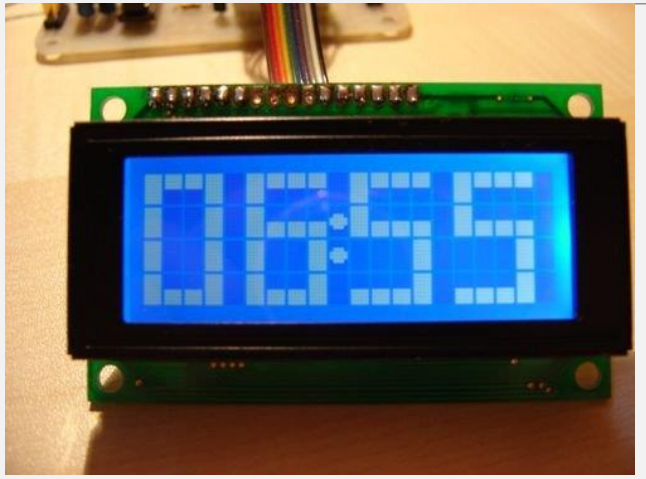

ATMEGA128
16AU 0601

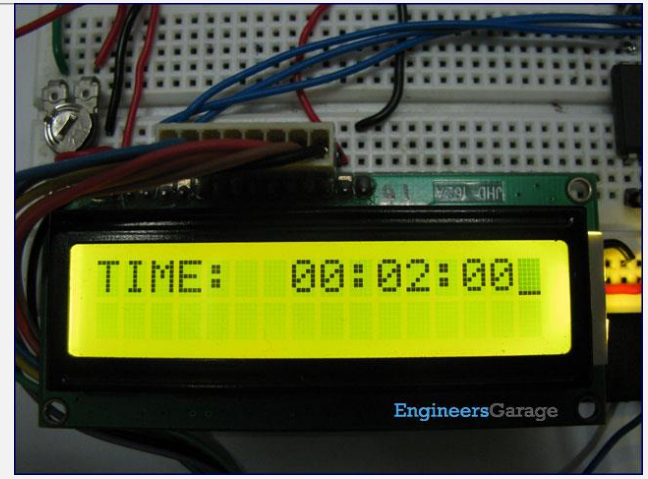


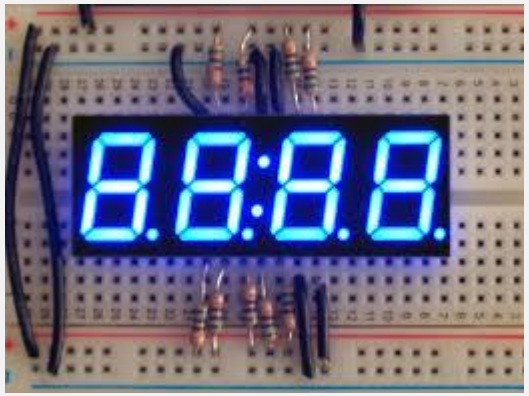

0
1
2
3


ATMEGA328P-PU

Microcontroller Circuits Output



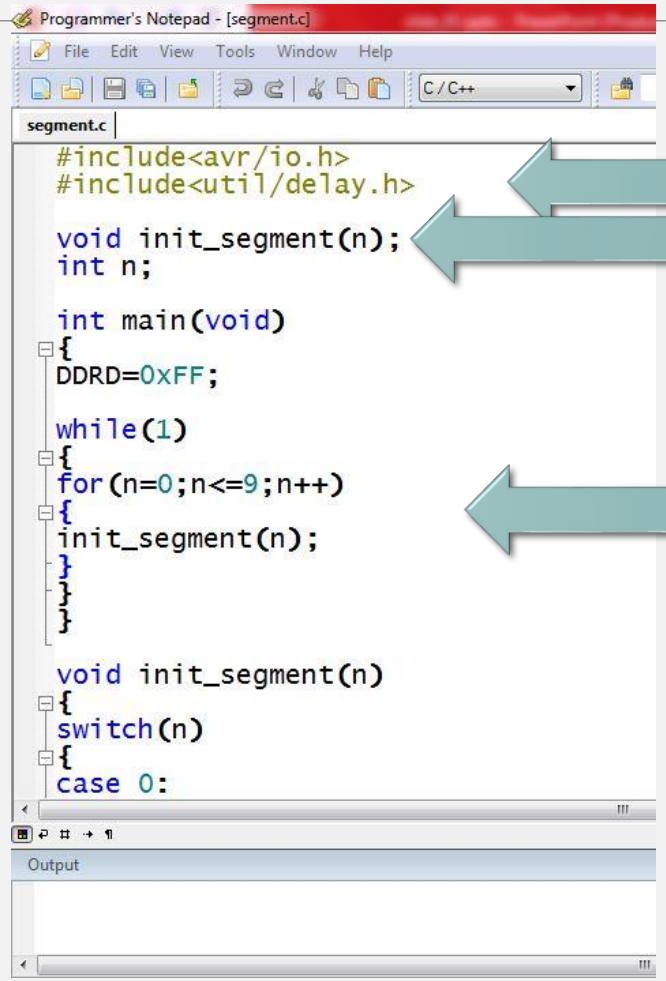




Programming for Microcontroller

- Header File
- Main Program Body
- User Defined Functions
- Variables
- Logic Making
- Loop Control etc…

Programming for Microcontroller

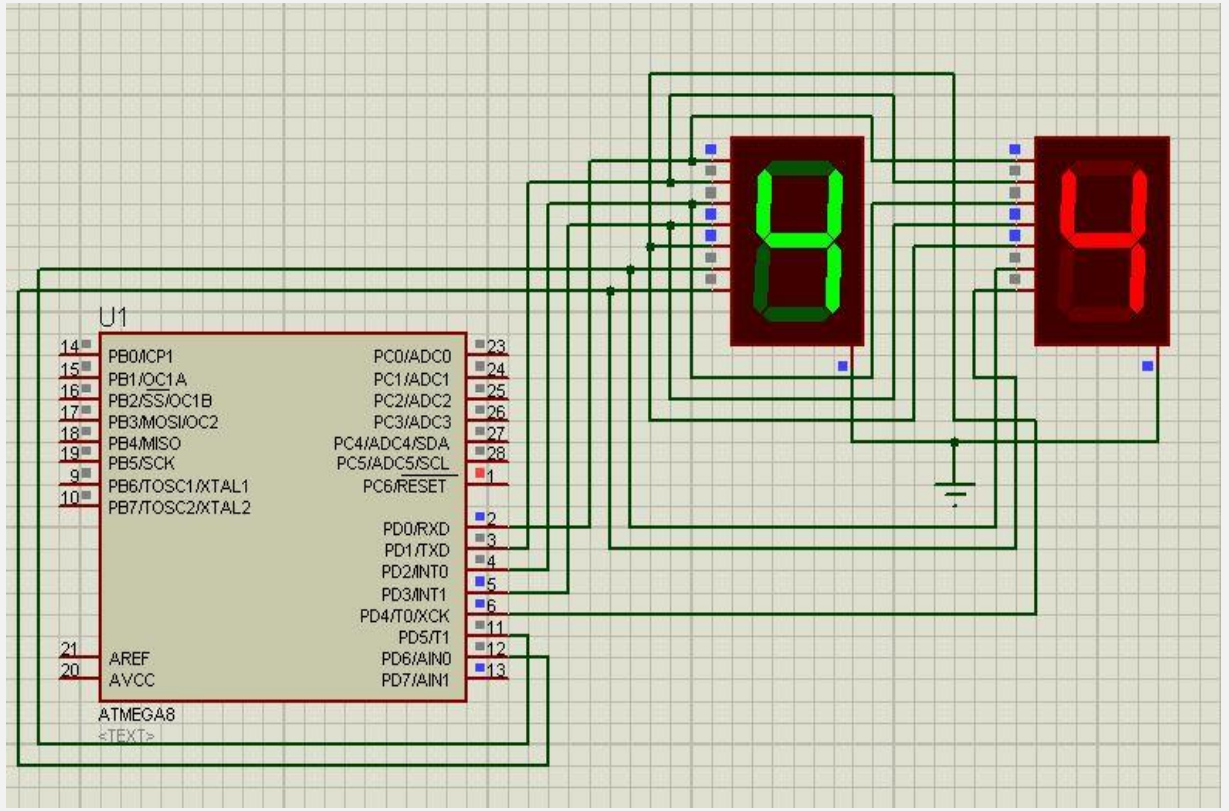


Header File

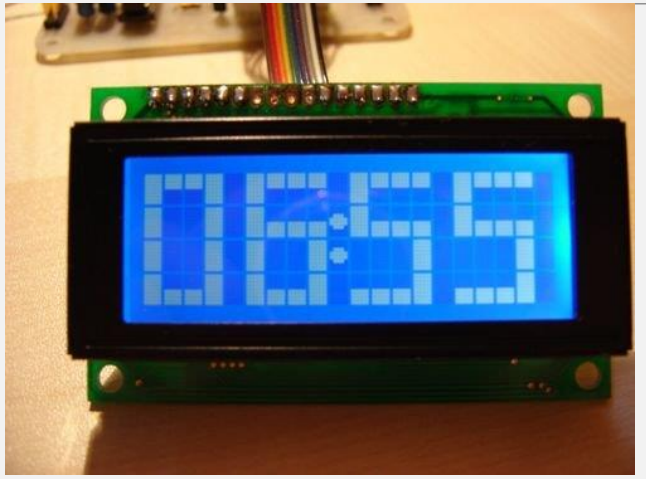
User Defined Function

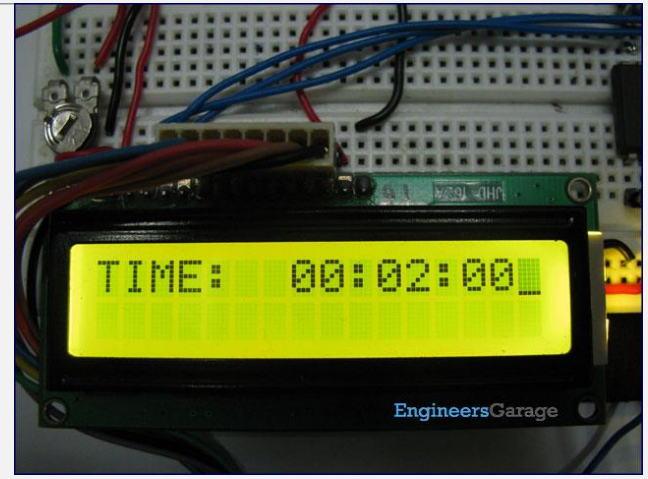
Main Program Body

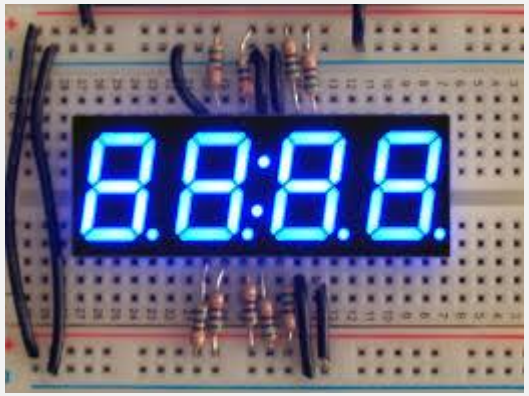
Programming Output



Microcontroller Circuits Output







Peripherals

Electronic Devices

Sensor

Display

Keypad

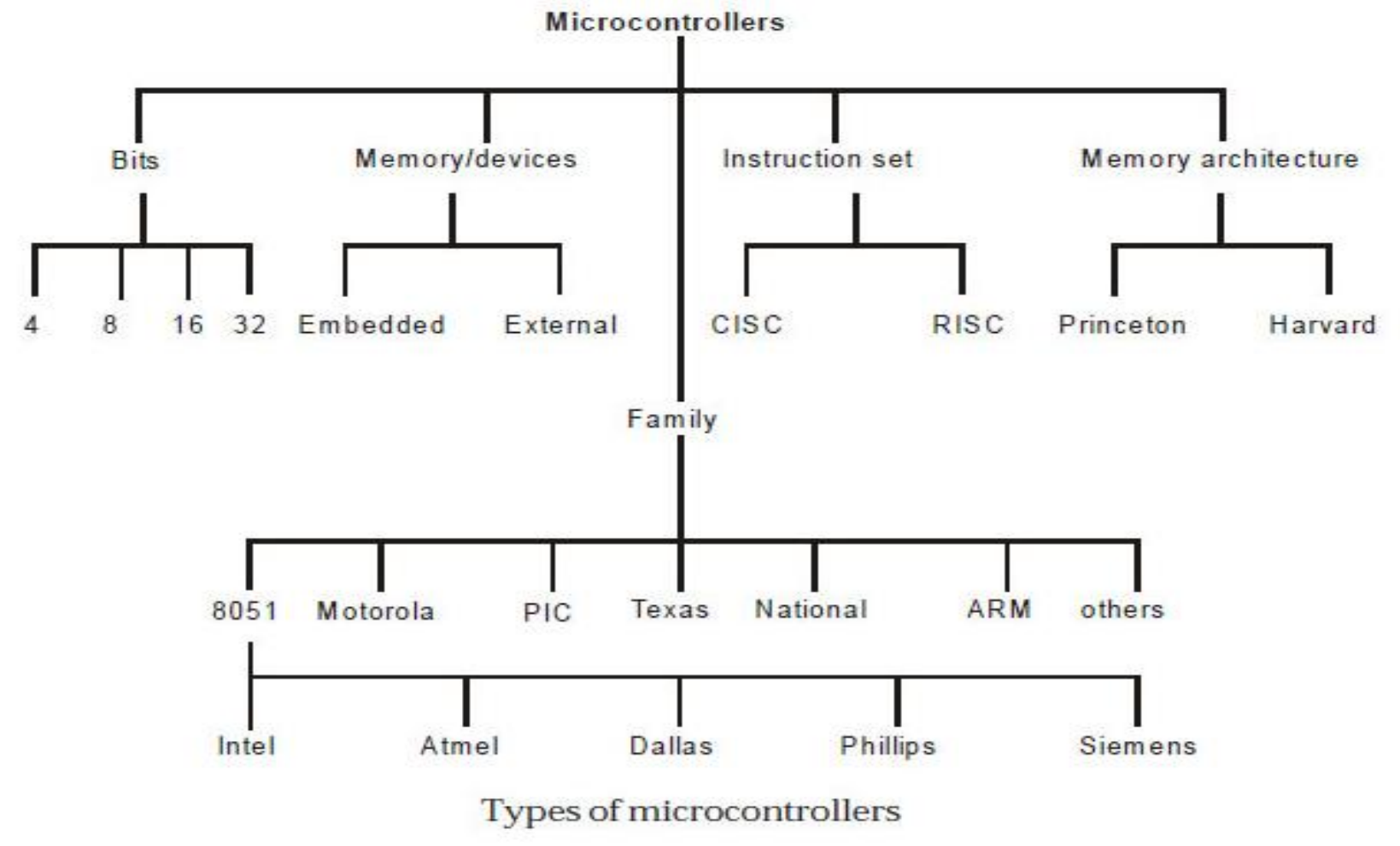
Motor

Speaker

Microcontroller Introduction

‘A **microcontroller** (sometimes abbreviated **µC**, **uC** or **MCU**) is a small computer on a single **integrated circuit** containing a **processor core**, **memory**, and programmable **input/output** peripherals. It can only perform simple task. A microcontroller is often described as a ‘**computer-on-a-chip**’.’

Microcontroller Classification



Types of microcontrollers

Commonly Used Microcontrollers

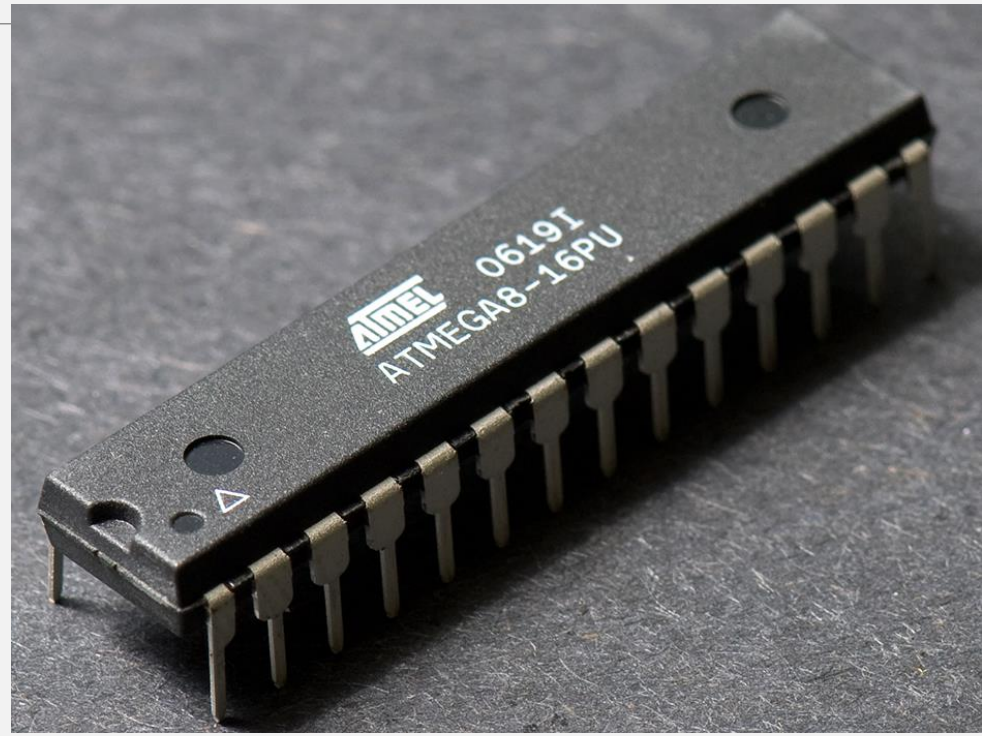
AVR Series:

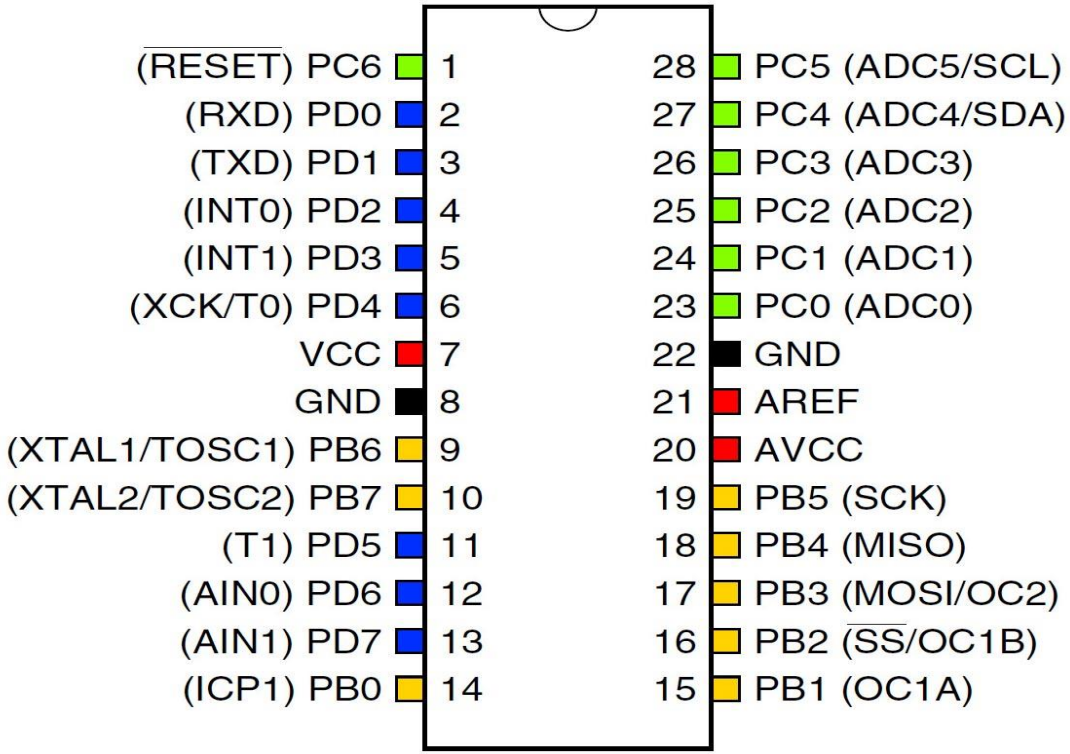
- ATmega8
- ATmega16
- ATmega32
- ATmega328 etc.

PIC Series:

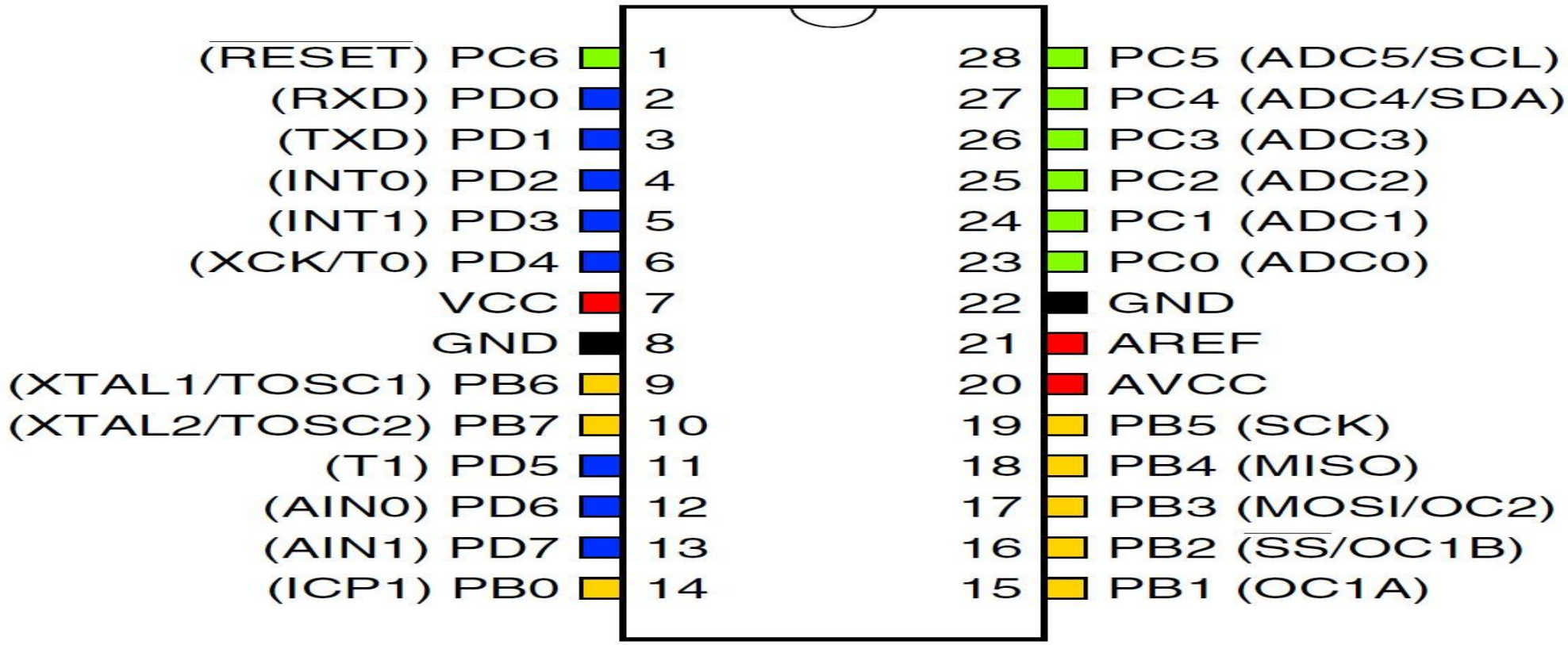
- PIC16F
- PIC18F etc.

ATmega8

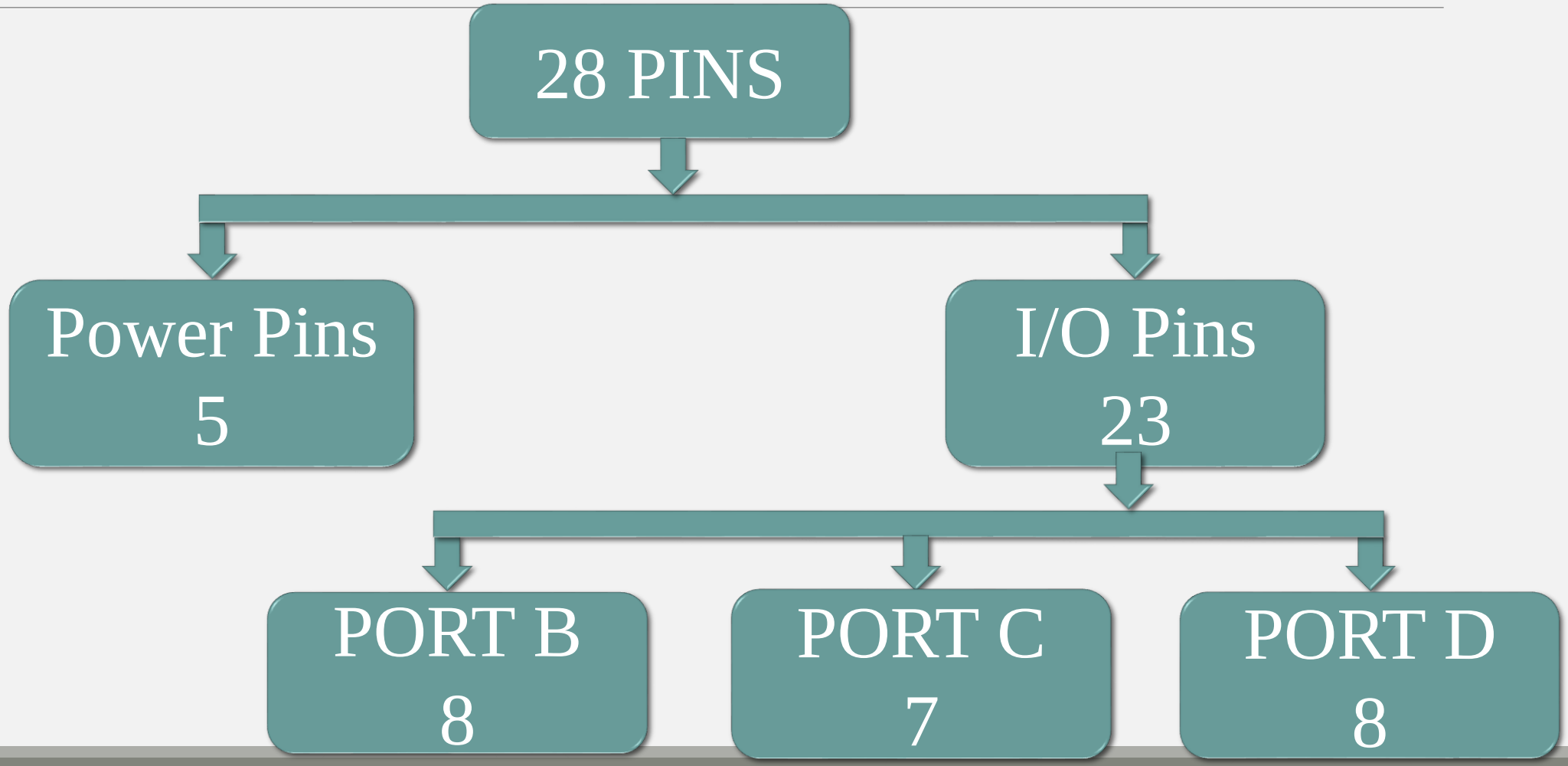

0619I
ATMEGA8-16PU


(RESET) PC6 1
(RXD) PD0 2
(TXD) PD1 3
(INT0) PD2 4
(INT1) PD3 5
(XCK/T0) PD4 6
VCC 7
GND 8
(XTAL1/TOSC1) PB6 9
(XTAL2/TOSC2) PB7 10
(T1) PD5 11
(AIN0) PD6 12
(AIN1) PD7 13
(ICP1) PB0 14
28 PC5 (ADC5/SCL)
27 PC4 (ADC4/SDA)
26 PC3 (ADC3)
25 PC2 (ADC2)
24 PC1 (ADC1)
23 PC0 (ADC0)
22 GND
21 AREF
20 AVCC
19 PB5 (SCK)
18 PB4 (MISO)
17 PB3 (MOSI/OC2)
16 PB2 (SS/OC1B)
15 PB1 (OC1A)

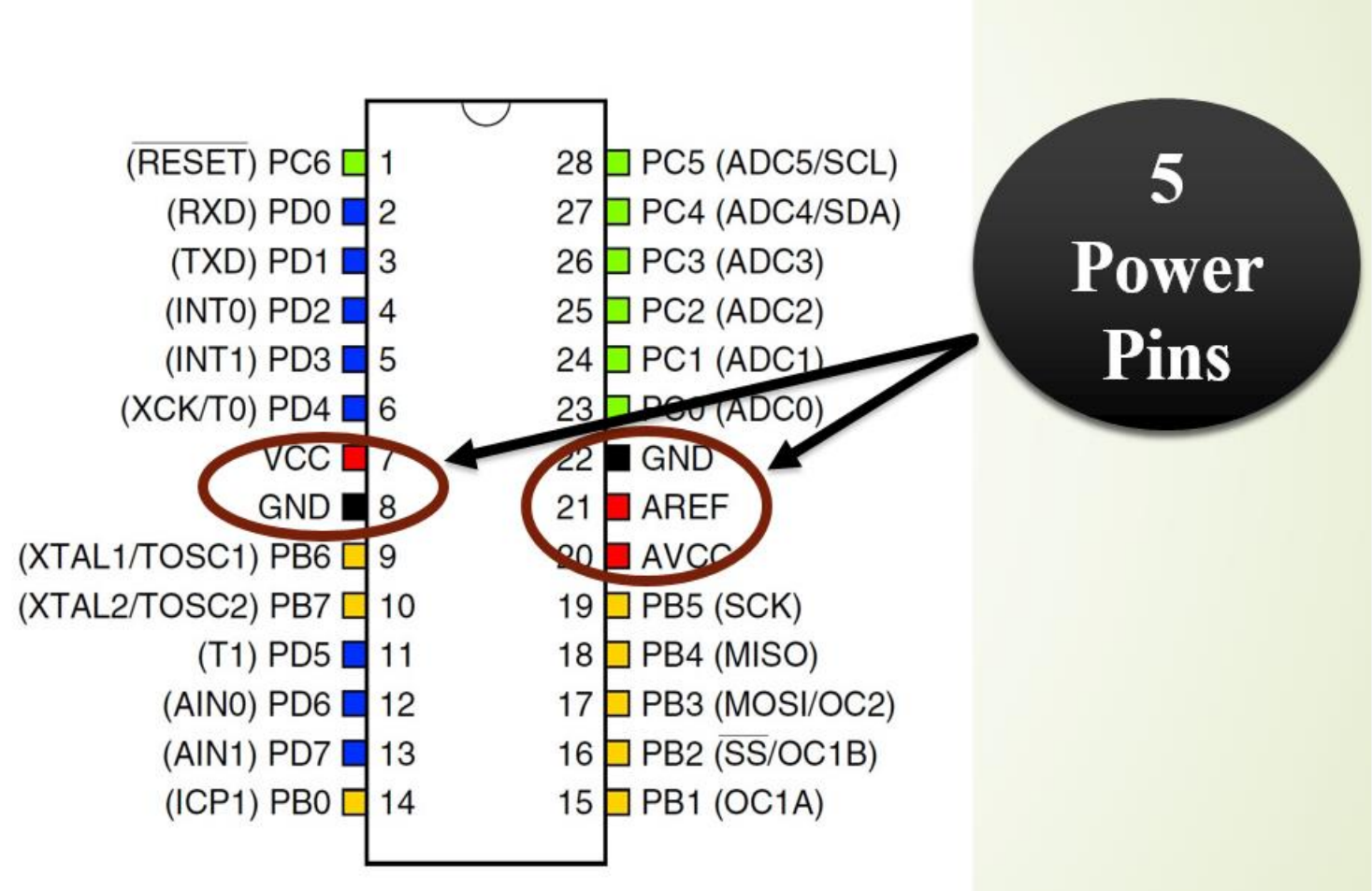
Pin Diagram of ATmega8



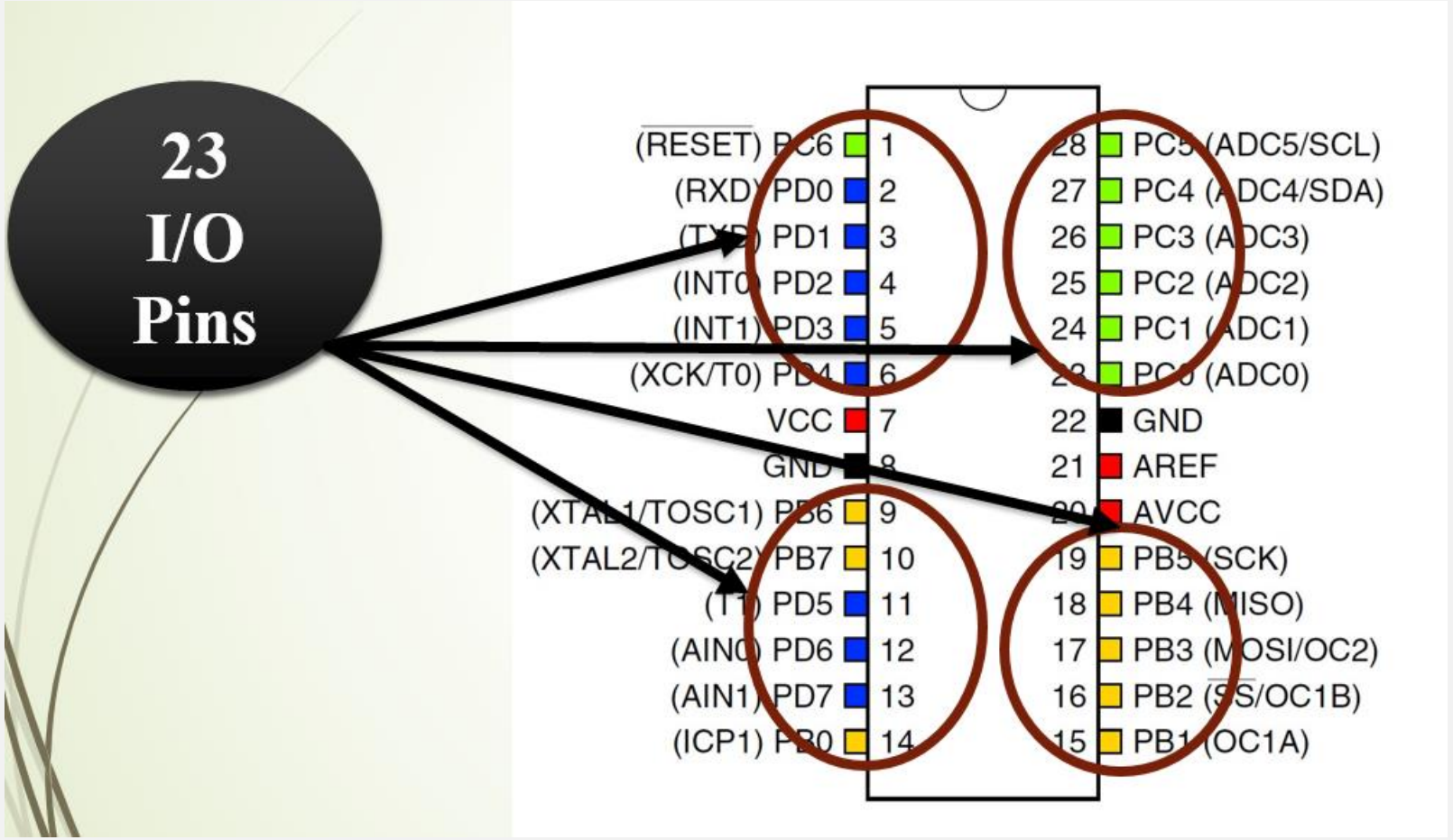
Pin Classification of ATmega8



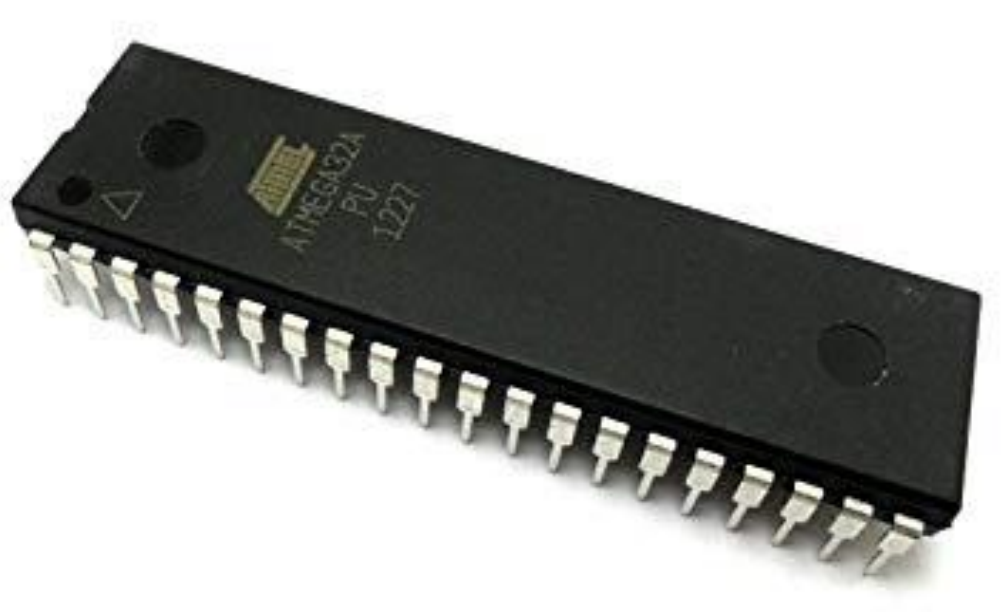
Pin Classification of ATmega8

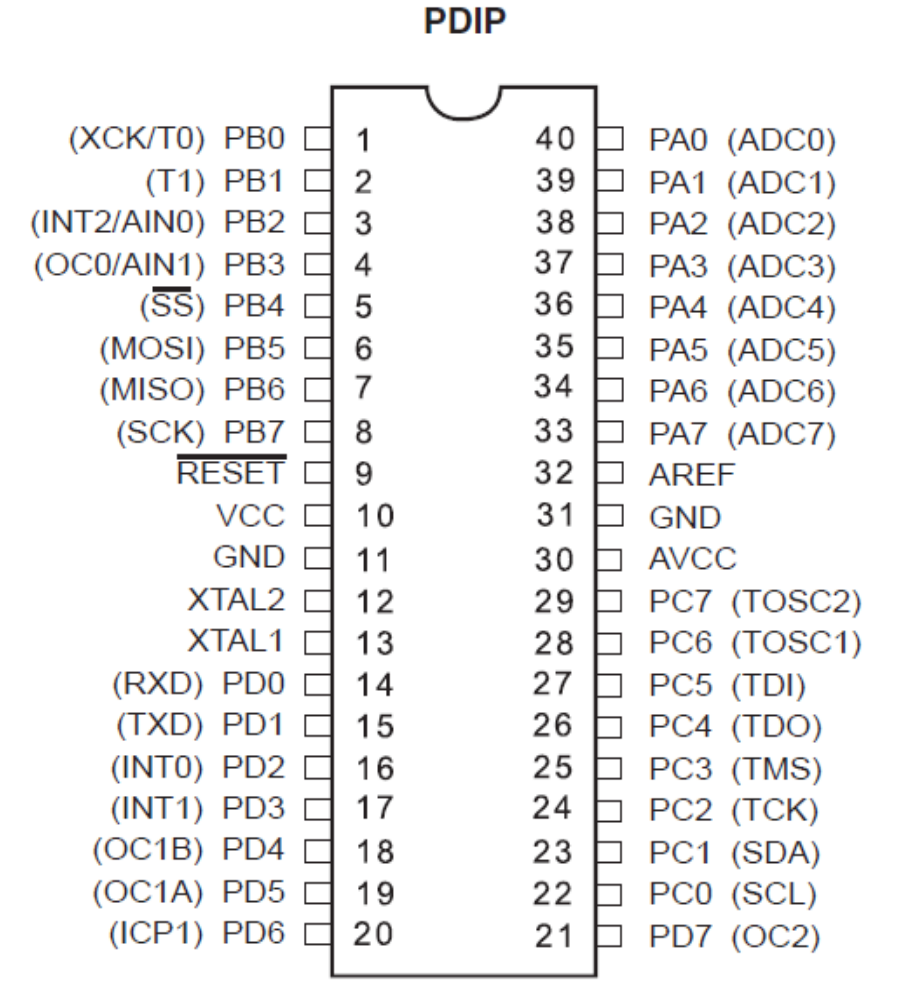


Pin Classification of ATmega8

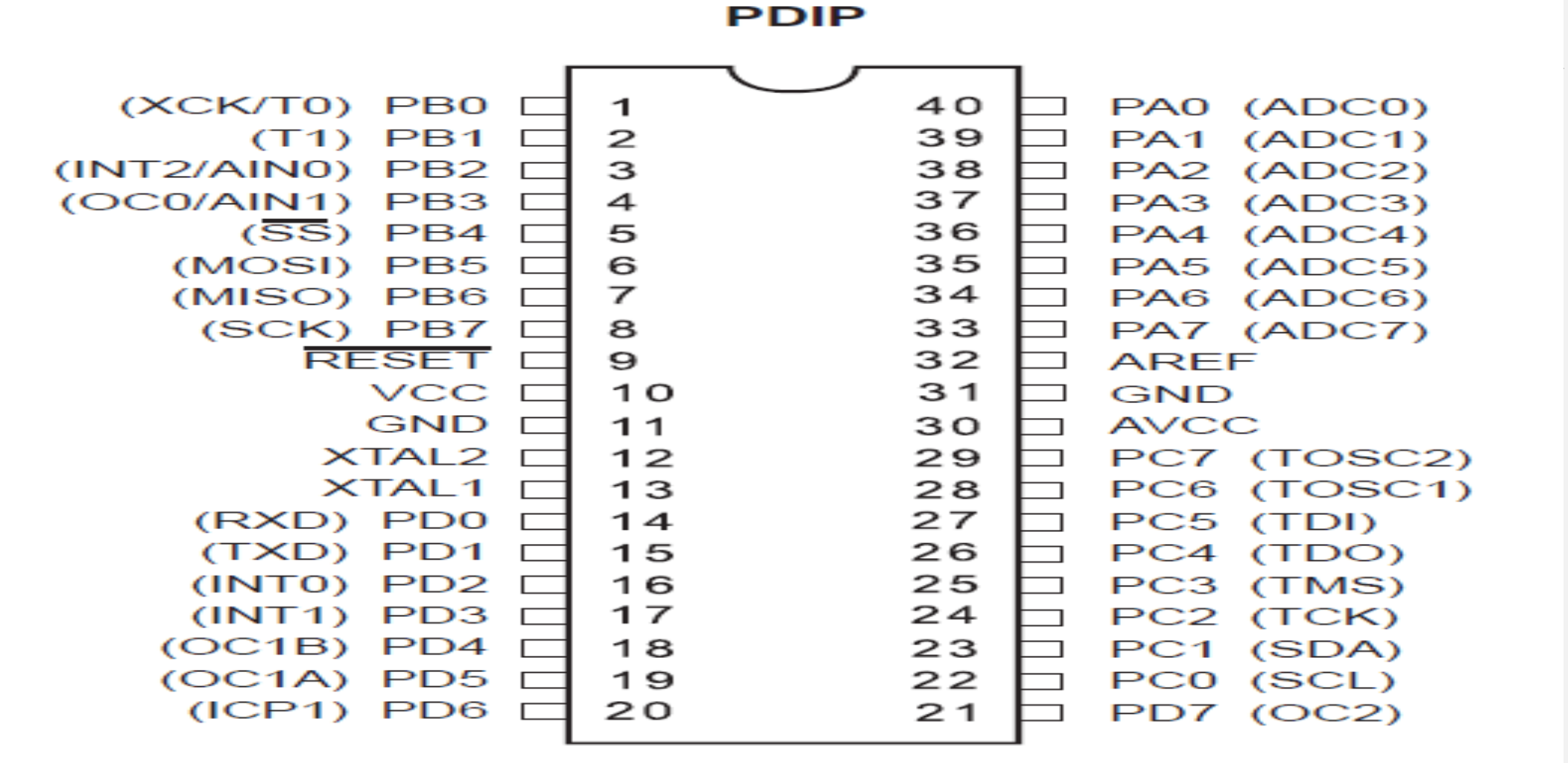


ATmega32


ATMEGA32A
PU
1227


PDIP
(XCK/T0) PB0 1
(T1) PB1 2
(INT2/AIN0) PB2 3
(OC0/AIN1) PB3 4
(SS) PB4 5
(MOSI) PB5 6
(MISO) PB6 7
(SCK) PB7 8
RESET 9
VCC 10
GND 11
XTAL2 12
XTAL1 13
(RXD) PD0 14
(TXD) PD1 15
(INT0) PD2 16
(INT1) PD3 17
(OC1B) PD4 18
(OC1A) PD5 19
(ICP1) PD6 20
40 PA0 (ADC0)
39 PA1 (ADC1)
38 PA2 (ADC2)
37 PA3 (ADC3)
36 PA4 (ADC4)
35 PA5 (ADC5)
34 PA6 (ADC6)
33 PA7 (ADC7)
32 AREF
31 GND
30 AVCC
29 PC7 (TOSC2)
28 PC6 (TOSC1)
27 PC5 (TDI)
26 PC4 (TDO)
25 PC3 (TMS)
24 PC2 (TCK)
23 PC1 (SDA)
22 PC0 (SCL)
21 PD7 (OC2)

Pin Classification of ATmega32



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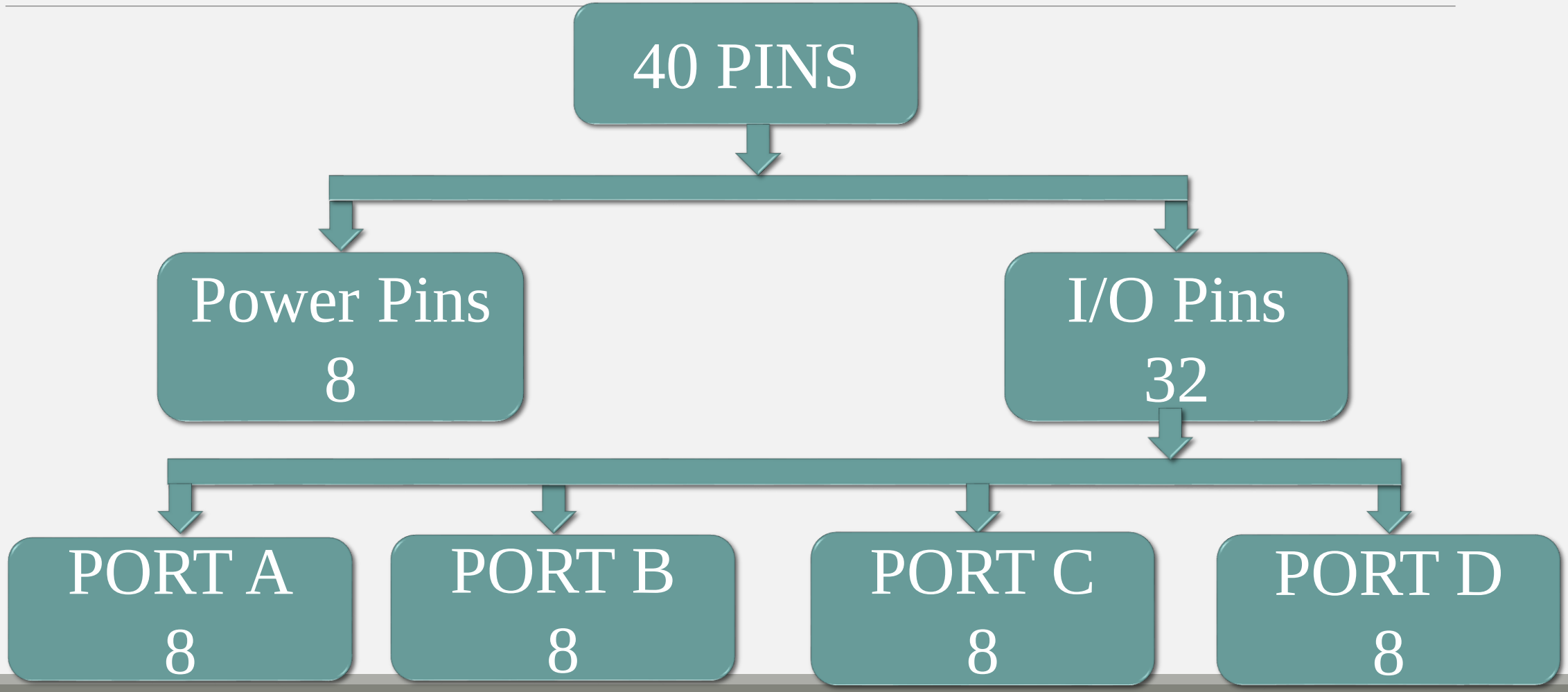

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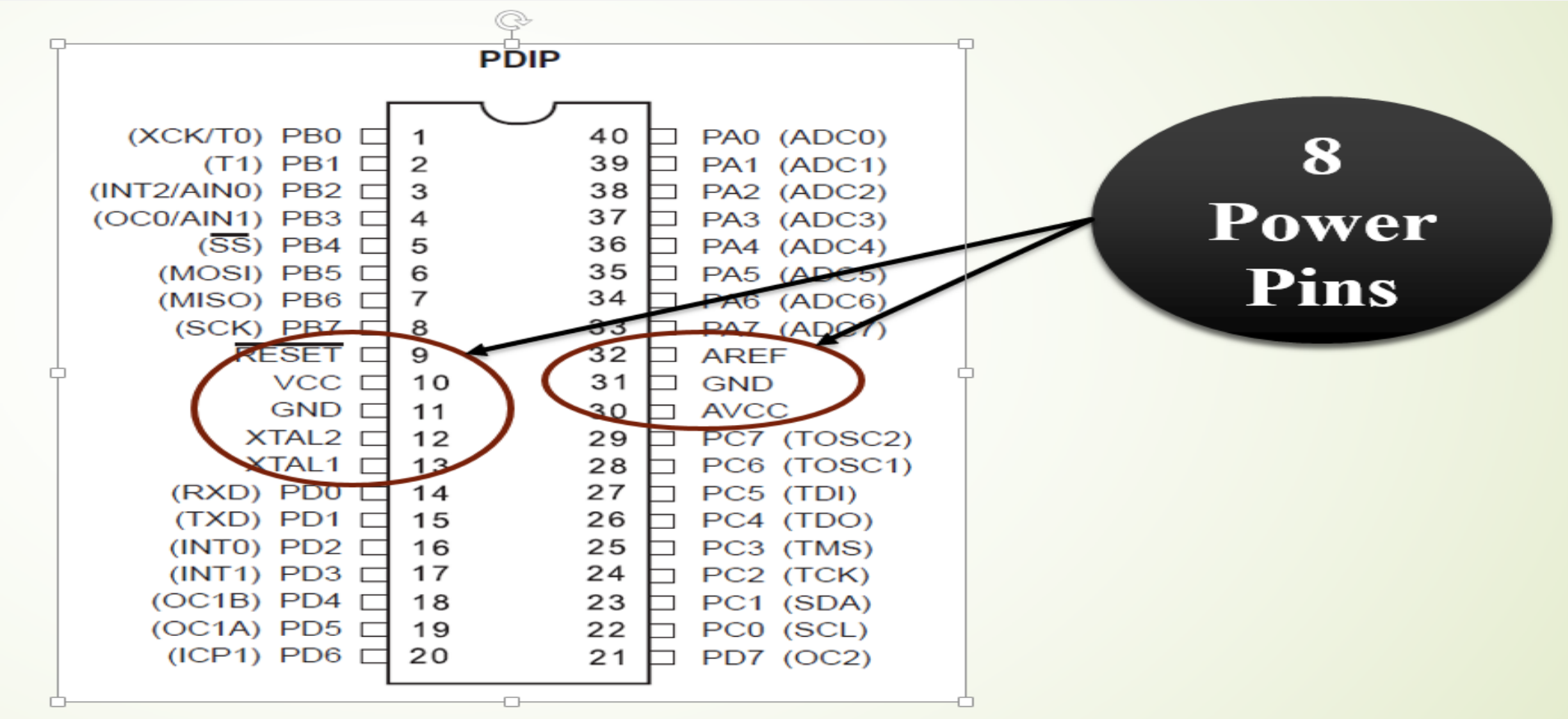

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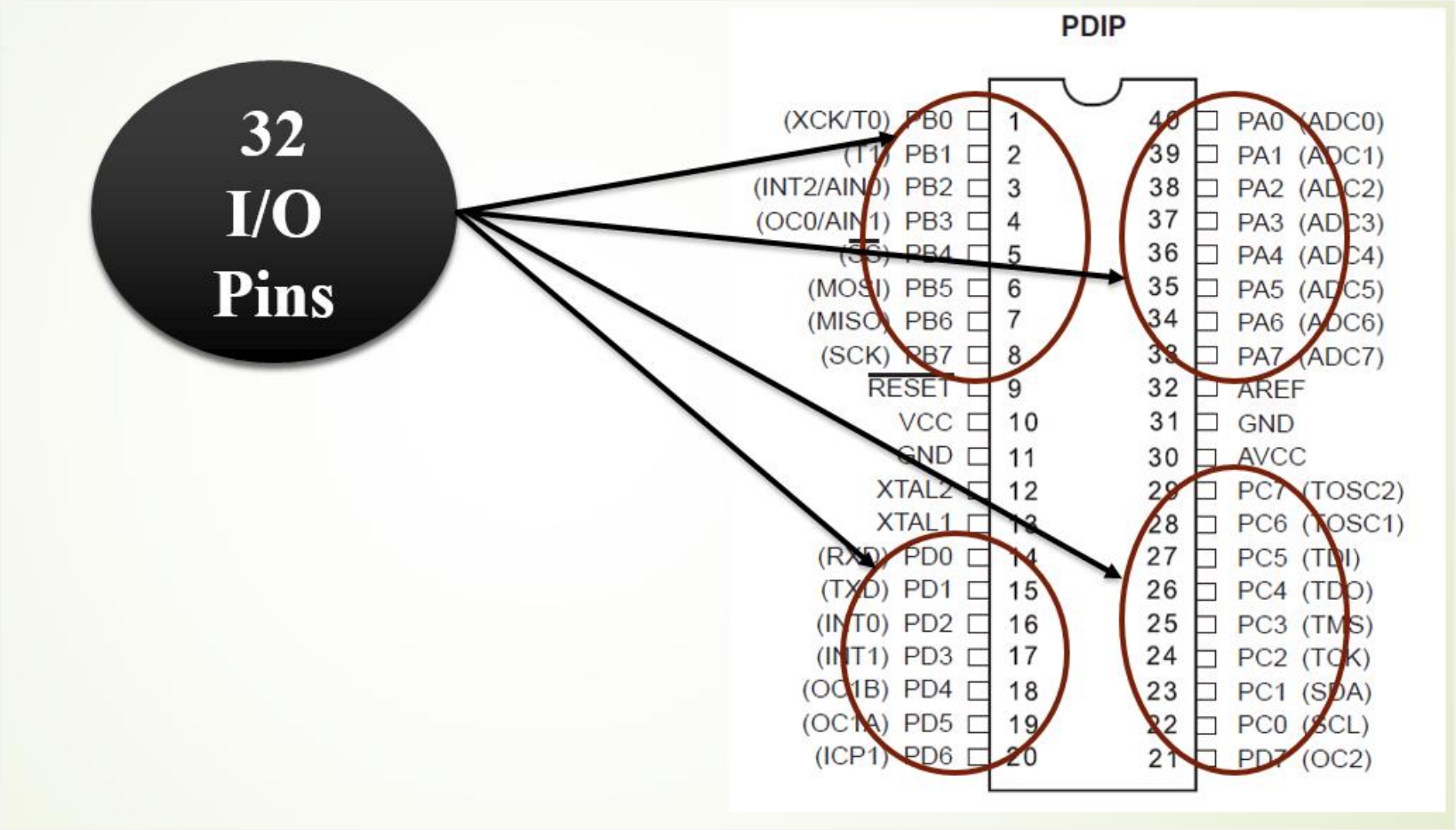

Have a Wonderful Journey with Microcontroller !