

## Assignment 1

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# What is difference between microcontroller families and brands?

There difference between microcontroller families and sure between brands so we family ARM its brand is ARM ,family PIC & AVR its brand is Microship technology and MSP 340 its brand is Texas Instruments ..ect

Some brands they are just designers not manufacture like ARM

Let's get deep in families:

## ARM

- Cortex M

The **ARM Cortex-M** is a group of 32-bit RISC ARM processor cores licensed by ARM Limited.

These cores are optimized for low-cost and energy-efficient integrated circuits, which have been embedded in tens of billions of consumer devices. Though they are most often the main component of microcontroller chips, sometimes they are embedded inside other types of chips too. The Cortex-M family consists of Cortex-M0, Cortex-M0+, Cortex-M1, Cortex-M3, Cortex-M4, Cortex-

M7, Cortex-M23. A [floating-point unit](#) (FPU) option is available for Cortex-M4 / M7 / M33 / cores, and when included in the silicon these cores are sometimes known as "Cortex-MxF", where 'x' is the core variant.

- Cortex -R:

The **ARM Cortex-R** is a family of [32-bit](#) and [64-bit RISC ARM](#) processor cores licensed by [Arm Ltd](#). The cores are optimized for hard [real-time](#) and [safety-critical](#) applications. Cores in this family implement the ARM Real-time (R) profile, which is one of three architecture profiles, the other two being the Application (A) profile implemented by the [Cortex-A](#) family and the Microcontroller (M) profile implemented by the [Cortex-M](#) family.

## PIC

The PIC Microcontroller Family from Microchip Technology is a widely used line of microcontrollers known for their reliability, performance, and extensive application range

- **PIC16 Series:** This family of 8-bit microcontrollers is ideal for low- to mid-range applications. For example, the PIC16F877A operates at up to 20 MHz and includes features such as a 10-bit ADC, PWM, and multiple

digital I/O ports. It's commonly used in automotive, industrial, and consumer electronics applications.

- **PIC18 Series:** Building on the capabilities of the PIC16 family, the PIC18 series offers enhanced performance with 8-bit architecture operating at up to 64 MHz. The PIC18F4550, for instance, includes built-in USB support, making it suitable for applications like data logging, communications, and embedded USB devices.

Then let's compare between the summer training microcontroller pic16f877a and the microcontroller of this course tm4c123f

Features	PIC16F877A	TM4C123F
Architecture	8-bit microcontroller 14-bit instruction set architecture Up to 20 MHz	ARM Cortex-M4F (32-bit) ARM Thumb-2 instruction set Up to 80 MHz
memory	Flash Memory: 14 KB SRAM: 368 bytes EEPROM: 256 bytes	Flash Memory: Up to 256 KB SRAM: 32 KB EEPROM: Not available
Peripherals	ADC: 10-bit, 8 channels PWM: 2 channels	ADC: 12-bit, up to 12 channels PWM: 6 channels

	Communication Interfaces: 1x SPI, 1x I2C, 1x USART Digital I/O: 33 pins	Communication Interfaces: Multiple (e.g., 4x UART, 2x I2C, 2x SPI, USB) Digital I/O: Up to 43 pins
Application	e for battery-operated devices	Various low-power Applications for energy-efficient operation.
Data handling	8-bit	32-bit