

ARM-Cortex-M3/M4 Processor

Motivation to learn ARM-Cortex-M Processors

- It's an embedded processor used in most of the Microcontrollers you see today and used in wide ranges of Embedded applications.
 - Battery powered devices like health monitoring and fitness tracking applications, Medical Meters
 - Automotive applications
 - IOT applications
 - Mobile and Home Appliances
 - Home/Building automations
 - Toys and Consumer products
 - Test and Measurement devices



Wear + Life

Water-resistant wristband with a 5-day battery life
(Battery life and charge cycles vary with use,
settings and other factors. Actual results will vary)



Wireless Syncing

Sync stats wirelessly & automatically
to computers and leading
smartphones



Microcontroller : STM32L151C6 by STMicro
Processor : ARM Cortex M3
Application Type : Ultra Low power

TomTom Spark 3 GPS Multisport Fitness Watch



Microcontroller : **SAM5x (Atmel SMART ARM Cortex-M7 Microcontrollers)**
Processor : **ARM Cortex M7**
Application Type : **Ultra Low power**

Motivation to learn ARM-Cortex-M Processors Contd..

- Most of the famous MCU manufacturers produce microcontrollers based on ARM Cortex M processors.
 - TI (Low power battery based applications)
 - STMicro (High + medium + low performance MCUs)
 - Toshiba (measuring Equipments + metering)
 - NXP
 - Microchip
 - Broadcom (Wireless Connectivity, IOT)
 - There are many.....

Cortex
M3/M4

Micro-Controller



Many More



Motivation to learn ARM-Cortex-M Processors Contd..

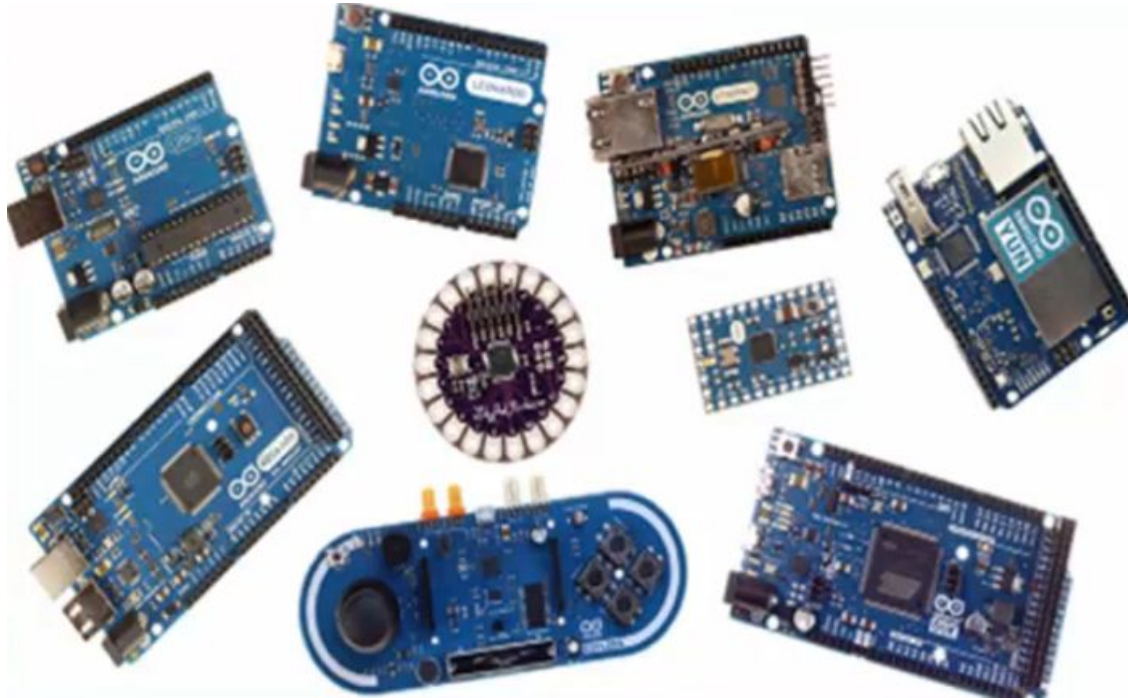
- Most of the manufacturers love to use ARM Cortex M processor in their design because of its minimal cost, minimal power and minimal silicon area.
- It's a 32 bit processor which will surely boost the computational performance of an application and it comes with almost same the price of 8 bit or 16 bit traditional processor.
- You can use this processor based MCUs in ultra low power to high performance based applications.
- Processor is customizable to include Floating point unit, DSP unit, MPU, etc.
- Very powerful and easy to use interrupt controller which supports 240 external interrupts.

Motivation to learn ARM-Cortex-M Processors Contd..

- RTOS friendly. That means it provides some exceptions, processor operational modes and access level configuration which helps to develop secure RTOS related applications.
- Its instruction set is rich and memory efficient. It uses Thumb instruction set which is a collection of 16 bit as well as 32 bit instructions. Cortex M processor cannot execute the ARM instruction set instructions. It uses Thumb instruction set which gives the same 32 bit ARM instruction performance but in 16 bit format.
- ARM provides lots of documentations to learn more about processors.

Major Competitors

1. AVR based Microcontrollers (8/16/32 bit) by Microchip(Atmel)



Most of the Arduino boards use Microcontrollers which are based on AVR Processor Core Of 8bit/16bit/32 bit architecture

2. MSP 430 Microcontrollers (16 bit) by TI

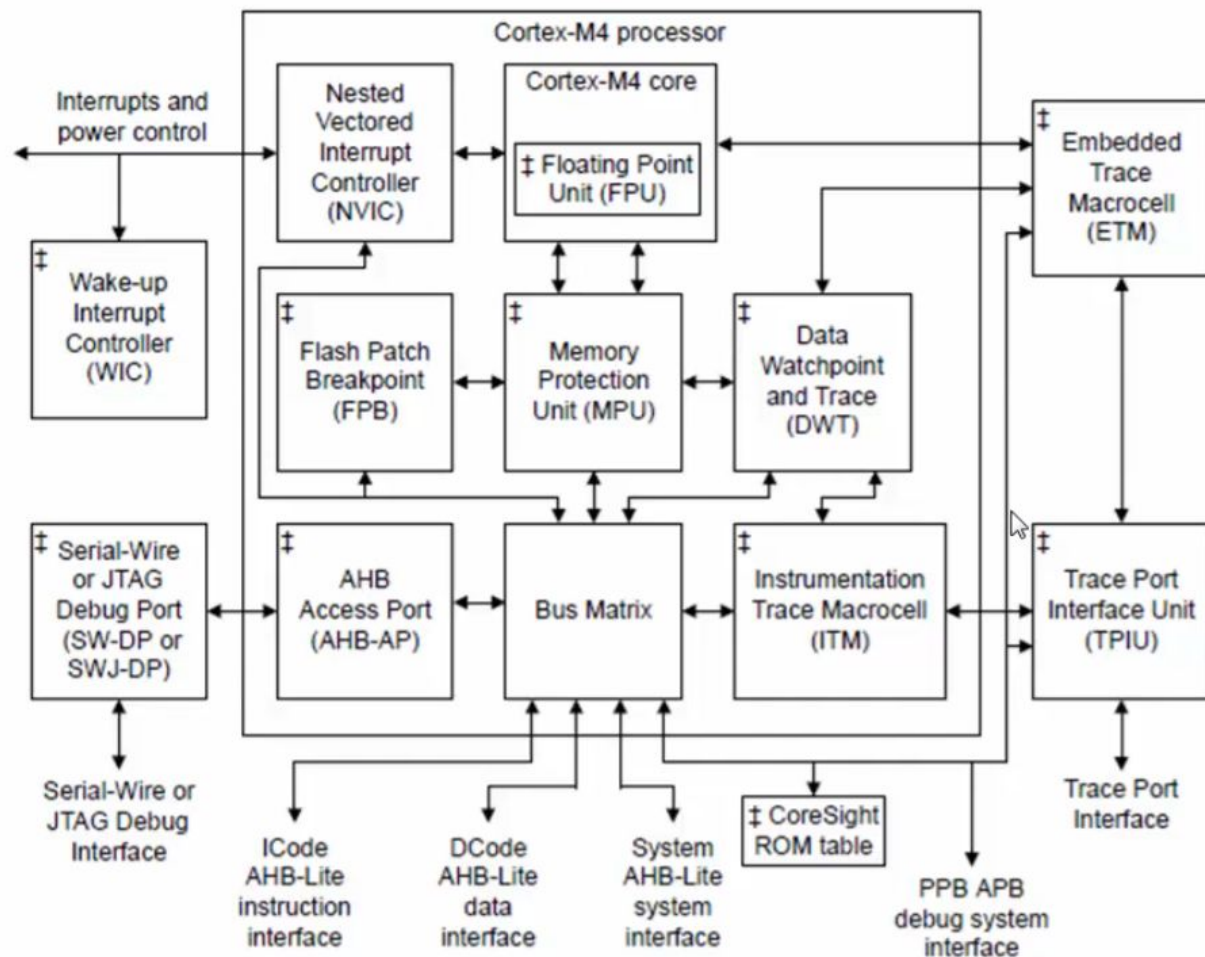


Processor vs Processor Core

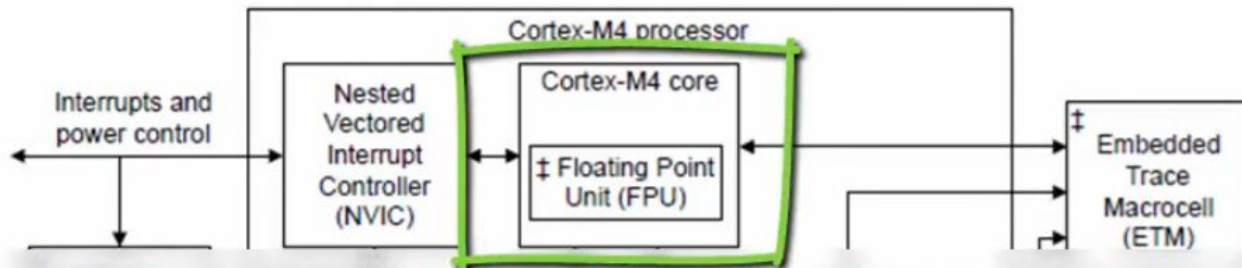
Refer to the website mentioned below for downloading the Technical Reference Manual (TRM) of ARM COrtex M4 processor

<https://developer.arm.com/documentation/100166/0001/>

Block diagram showing the structure of the Cortex-M4 processor.



Block diagram showing the structure of the Cortex-M4 processor.



Core consists of ALU where data computation takes place and result will be generated

It has the logic to decode and execute an Instruction

It has many registers to store and manipulate data

It has pipe line engine to boost the instruction execution

It consists of hardware multiplication and division engine

Address generation unit

Processor vs Microcontroller

Thank You!!!