ARM Processor family

- **General Introduction of ARM**

  A general overview about this processor family. The section is divided into:
    - Advanced Reduced-instruction-set-computer Machine
    - ARM registers
    - ARM instruction sets
    - ARM programmers' model
    - ARM exceptions
    - ARM Memory architecture

- **Set of ARM processors**

  Widest range of microprocessor cores to address the performance, power and cost requirements for almost all application markets.

  Processors grouped as follows:
    - Cortex - A: Highest performance, optimized for rich operating systems
    - Cortex - R: Fast response, optimized for high-performance, hard real-time applications
    - Cortex - M: Smallest/lowest power, optimized for discrete processing and microcontroller
    - SecurCore: Tamper resistant, optimized for security applications

- **Embedded vs Application processor**

This comparison will focus on the two most spread groups on the market.
ARM M processors and ARM A processor:

ARM M core	ARM A core
Single Core	Multi Core capable
< 550MHz	< 2.5Ghz
Single Application targeted	Operating System targeted
Low Power focused	High computational Power focused
Several low power operating mods	MMU & MPU
Power consumption optimized peripherals	External Memory interface with 64bit Address Space

Dhrystone performance difference:

Processor	Speed	Dhrystone MIPS
TI KeyStone 2 ARM A15 Quad Core	1.4 GHz	19600
ST STM32F217 ARM Cortex M3	120 MHz	150

As those two tables show the application field for the processor target different market segments:

ARM M core	ARM A core
IoT Products	Multimedia Appliances
Wearables	Smartphones
Real Time applications	Car Infotainment
Co- Controllers	Demanding computational tasks

https://training.ti.com/system/files/docs/keystone-ii-arm-a15-corepac-overview.pdf

http://www.st.com/content/st_com/en/products/microcontrollers/stm32-32-bit-arm-cortex-mcus/stm32f2-series.html?querycriteria=productId=SS1575

- **ARM 11 (ARMv6 architecture)**

The Raspberry Pi is a credit card-sized single-board computers developed to promote the teaching of basic computer science in schools and in developing countries. Developed by the Raspberry Pi Foundation in the United Kingdom. Major aim for the development was to keep the price as low as possible to enable this device to cover a huge market. With its first generation specification it was able to cover the basic needs to run an operating system and give people an easy entry point to programming.

Basic Specification:
- Broadcom BCM2835 SOC
- 700MHz ARM1176JZF-S (ARM11) processor (ARM v6 architecture)
- Hardware FPU support
- Performance equal to an 300MHz Pentium2
- L1/L2 Cache 16KB/128KB
- 512MB RAM
- Boots from SD Card
- integrated GPU

Commercial applications:
- Slice Media Player
  http://fiveninjas.com/#slice
- OTTO GIF Camera
  https://www.kickstarter.com/projects/1598272670/meet-otto-the-hackable-gif-camera

- **Example of embedded ARM processor: Cortex-M3**

Example of processor