

Beágyazott és érzékelő alapú rendszerek

2015 tavasz

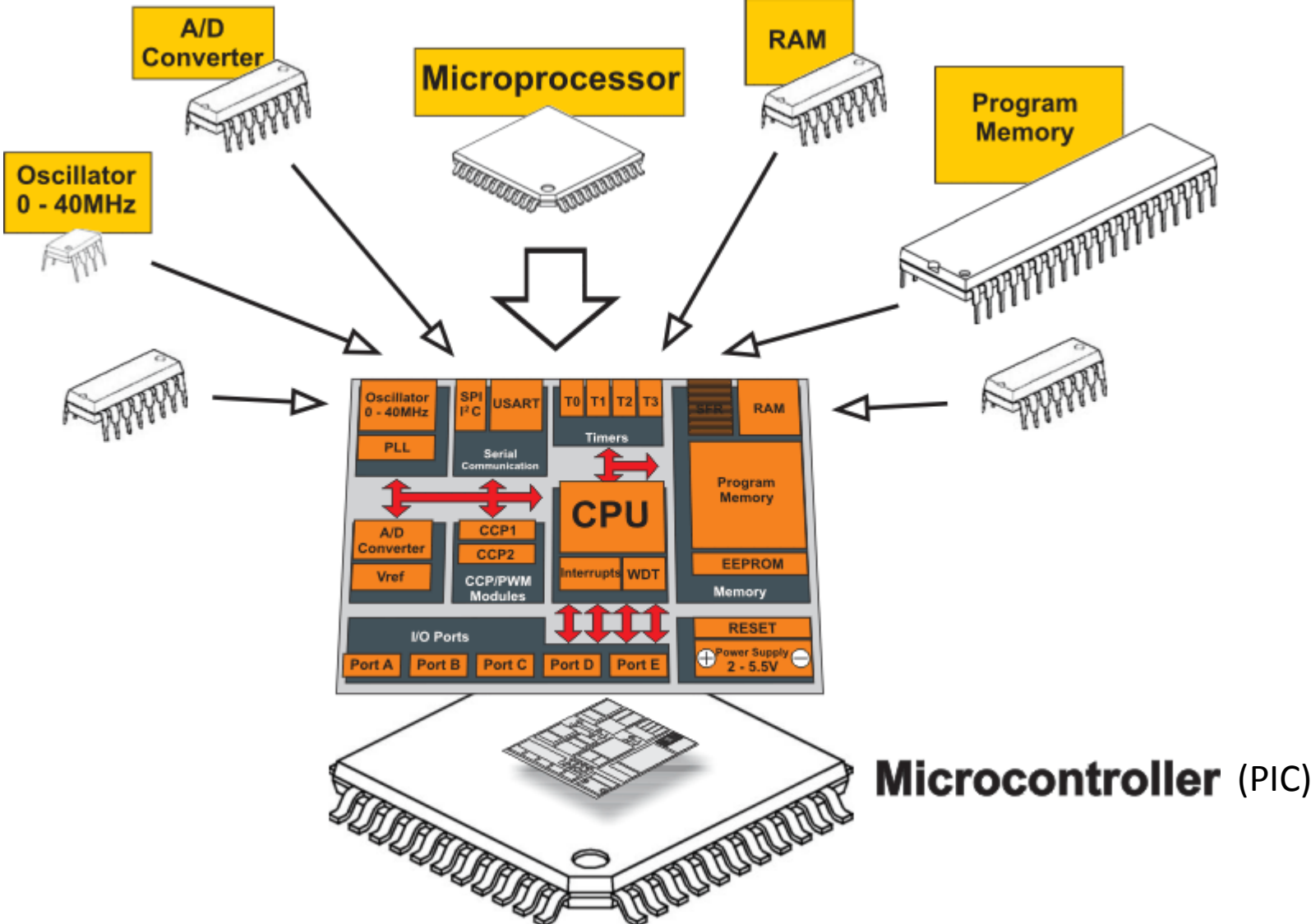
Ütemezés

- Mikrokontrollerek általános ismertetése, STM32F4 Discovery részletes bemutatása
- Programozás / debug üzemmód, féléves feladat témaválasztás, GPIO perifériák, ledék, gombok kezelése
- PWM jel
- Soros kommunikáció: USART, USB, (FTDI)
- ADC / DAC átalakítók, potméterek kezelése
- Időzítők
- Watchdog
- Megszakítások
- Szabályozási feladatok
- Féléves feladat leadás

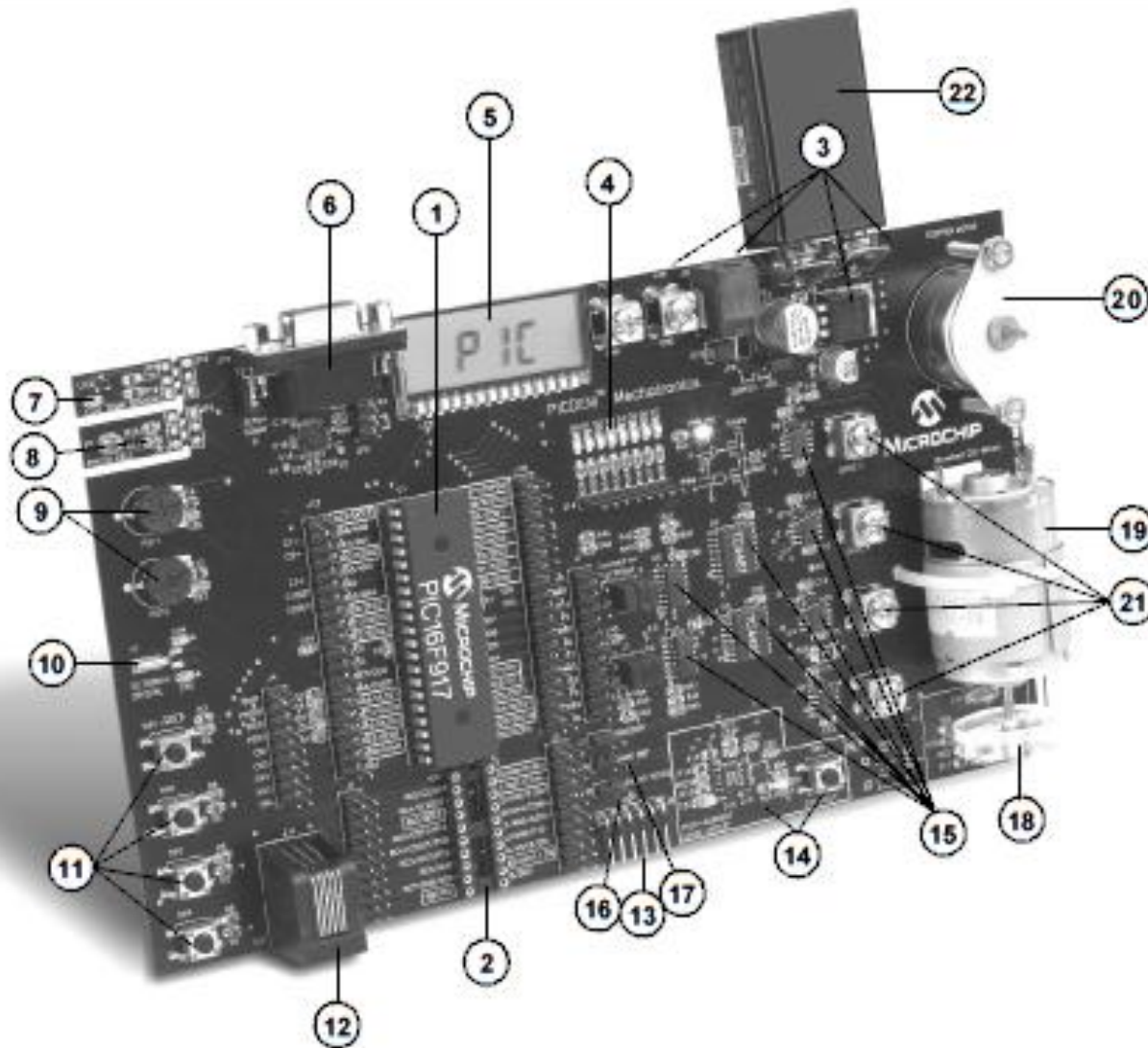
Számonkérés

- (Vizsga)
- Féléves feladat
 - Feladat kiírás
 - Munka: STM32F4 Discovery + ???
 - Dokumentáció (TDK?)
 - Prezentáció utolsó előtti héten
- *Szakdolgozat?*

Mikrocontroller (μC, uC, MCU)



PIC Mecha board



Legend:

1. 40-pin socket
2. 20-pin socket
3. On-board voltage regulator and power connections
4. 8 LEDs
5. 39 segment LCD connected to 14 pins on the 40-pin socket
6. RS-232 socket and associated hardware
7. Temperature sensor
8. Light sensor
9. 2 potentiometers
10. 32.768 kHz crystal
11. 4 tactile switches
12. In-Circuit Debugger (ICD) connector
13. In-Circuit Serial Programming™ (ICSP™) connector
14. Over-current protection circuit with Reset switch
15. 4 half-bridge MOSFET drives with associated MOSFET drivers and logic
16. Current sense for output stage
17. Back Electromagnetic Force (EMF) sense
18. Optical Interrupter for detecting the speed of the Brushed DC motor
19. Brushed DC motor
20. Stepper motor
21. Drive screw terminals
22. 9 Vdc battery

Programozás

FIGURE 1-3: CONNECTING THE MPLAB® ICD 2 TO THE PICDEM™ MECHATRONICS DEMO BOARD

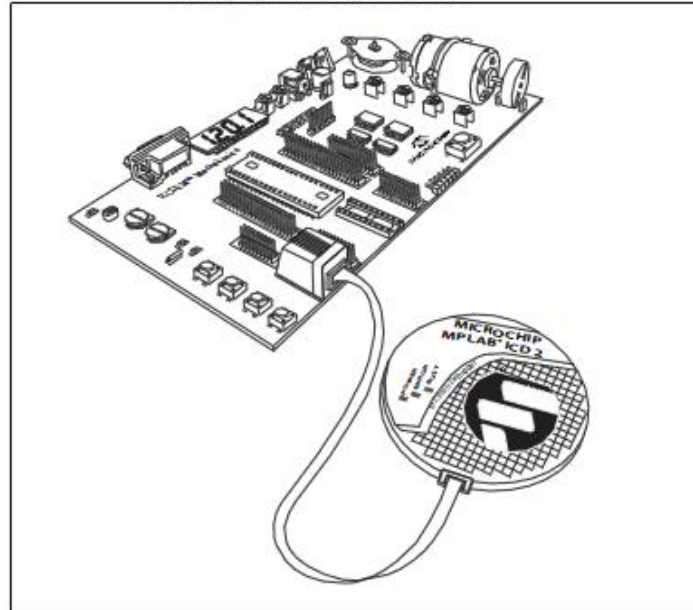
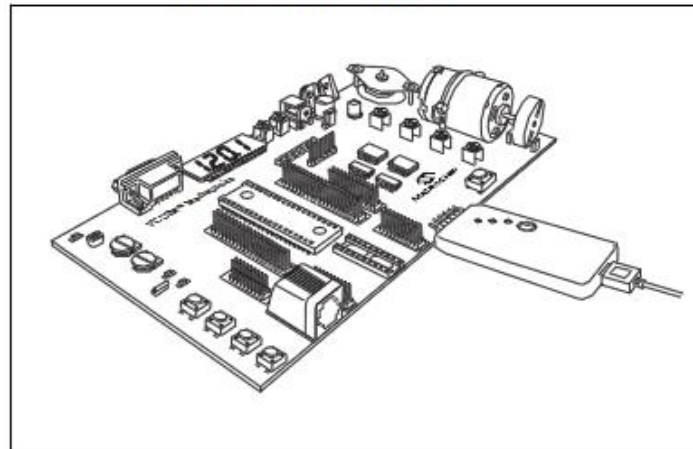
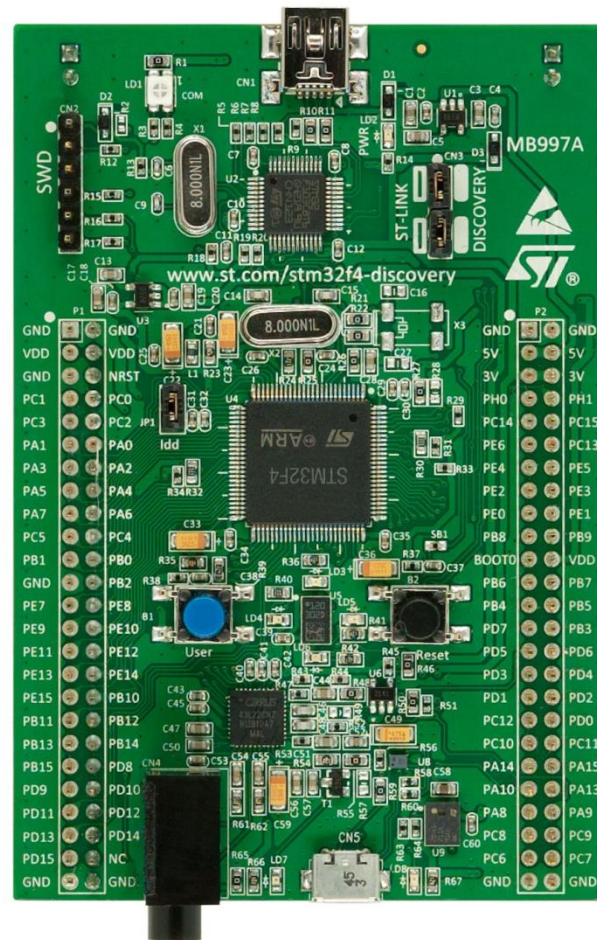


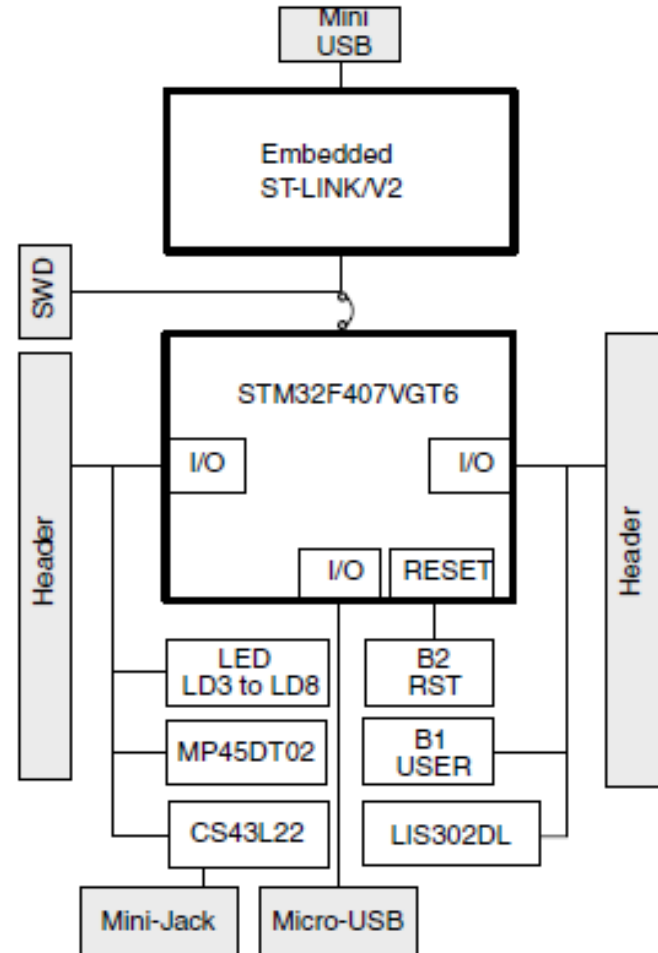
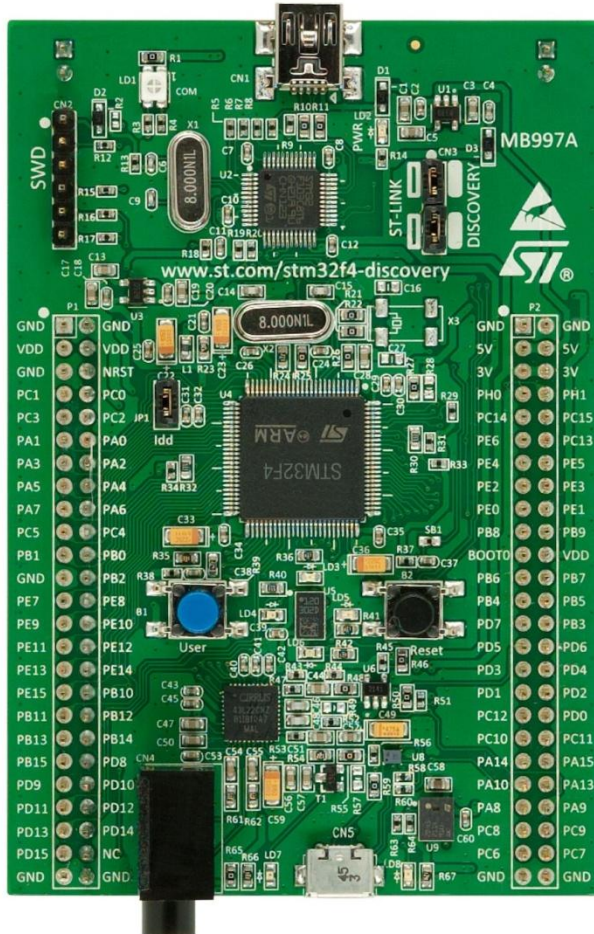
FIGURE 1-4: CONNECTING THE PICKIT™ 2 TO THE PICDEM™ MECHATRONICS DEMO BOARD



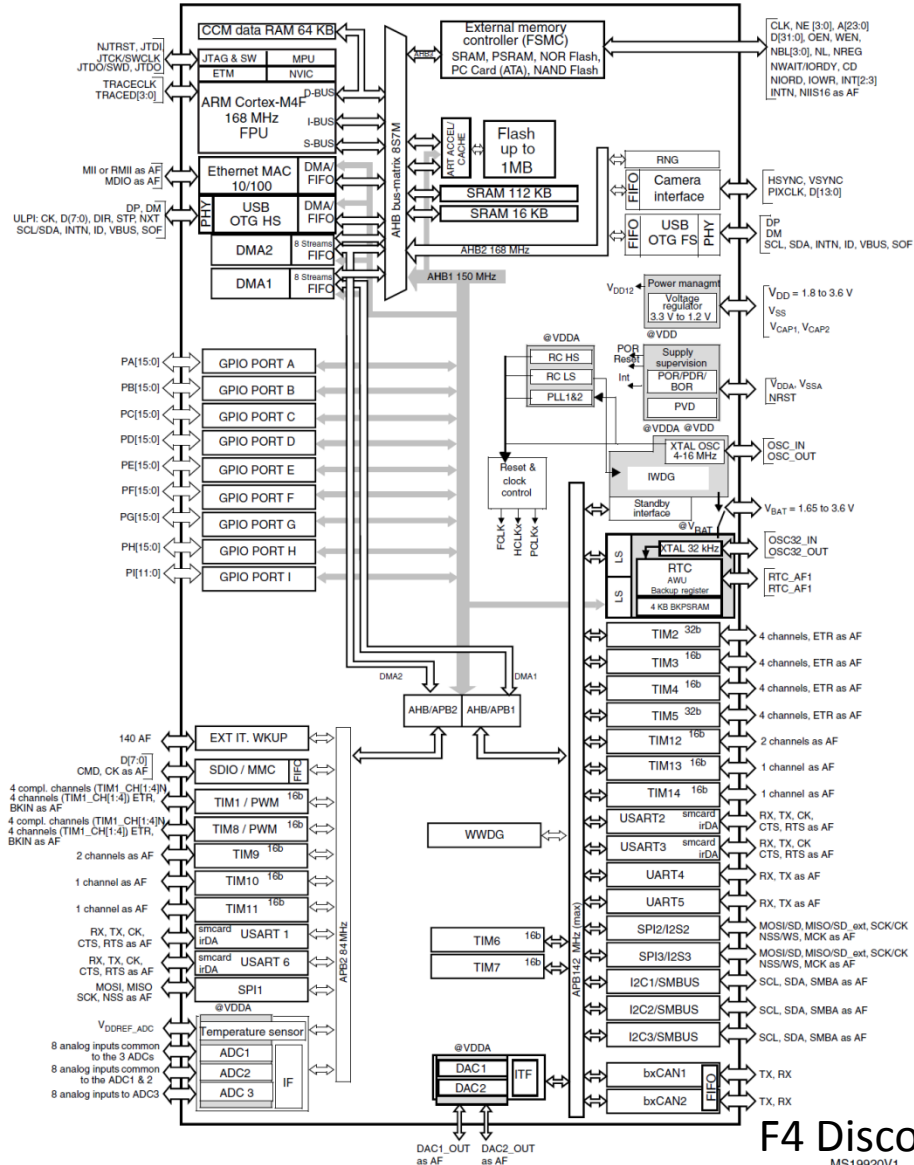
STM32F4 Discovery



STM32F4 Discovery



STM32F4 Discovery



PIC16/18 család

- 8 bites MCU (PIC16F917 – 20MHz)
- I/O:
 - 5 MIPS
 - 8 csatornás 10bites A/D
 - 1 USART
 - 1 I2C/SPI
 - 2 CCP (capture, compare, PWM)
 - 2x8bit, 1x16bit timer
 - stb

STM32F4 család

- 32 bites MCU, (STM32F407 168MHz + FPU)
- I/O:
 - 1 MB Flash/192+4 KBRAM,
 - USB OTG HS/FS,
 - Ethernet,
 - 17 TIM,
 - 3×12-bit ADC,
 - 2×12-bit DAC,
 - DMA
 - LCD parallel interface, 8080/6800 modes
 -

ARM
STM32F4

ARM evolúció

A8, A9: 600MHz+,
1..4 mag, jellemzően
mobil eszközök

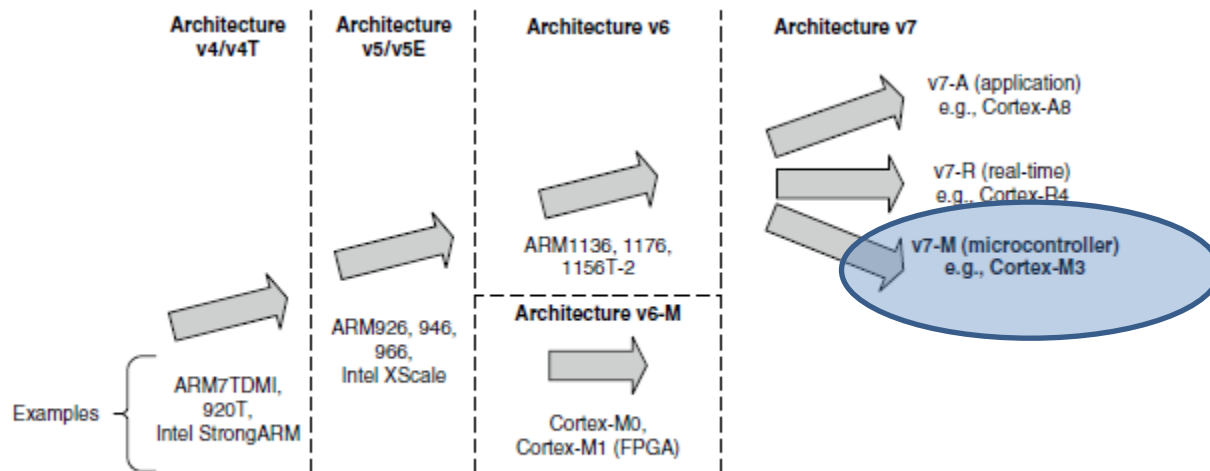
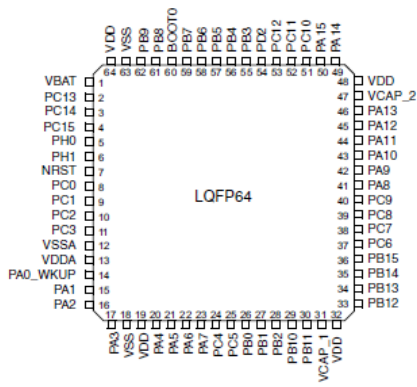


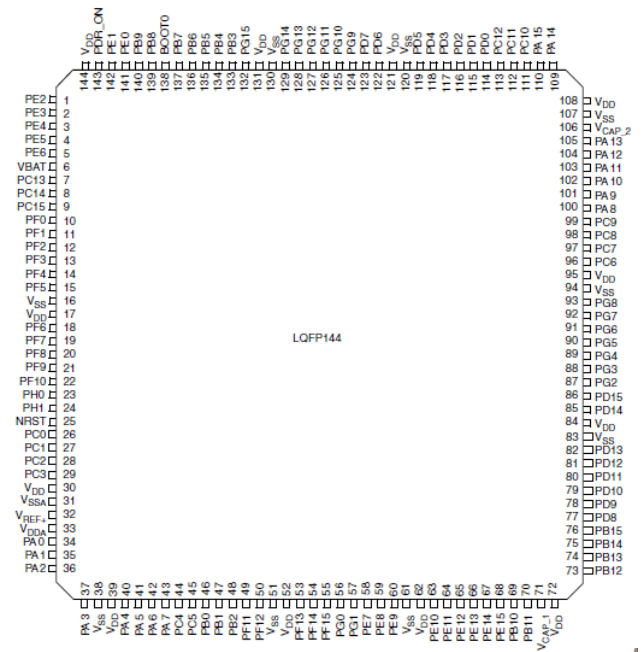
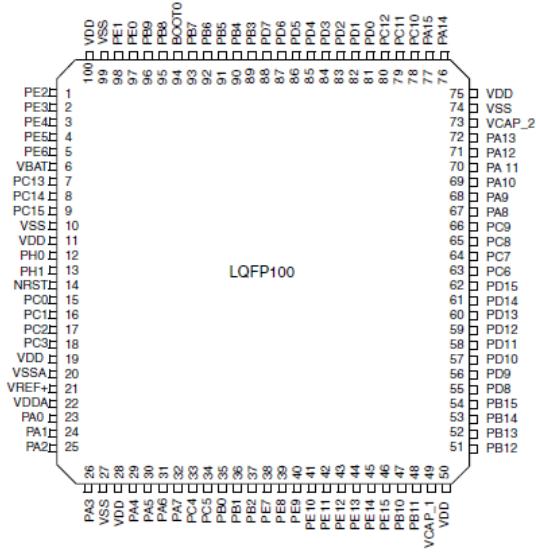
FIGURE 1.2

The Evolution of ARM Processor Architecture.

Lábkiosztás



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Lábkiosztás

Pin number						Pin name (function after reset) ⁽¹⁾	Pin type	I/O structure	Notes	Alternate functions	Additional functions
LQFP64	WLCSP90	LQFP100	LQFP144	UFBGA176	LQFP176						
14	C10	23	34	N3	40	PA0-WKUP (PA0)	I/O	FT	(5)	USART2_CTS/UART4_TX/ ETH_MII_CRS / TIM2_CH1_ETR/ TIM5_CH1 / TIM8_ETR/ EVENTOUT	ADC123_IN0/WKUP ⁽⁴⁾
15	F8	24	35	N2	41	PA1	I/O	FT	(4)	USART2_RTS / UART4_RX/ ETH_RMII_REF_CLK / ETH_MII_RX_CLK / TIM5_CH2 / TIM2_CH2/ EVENTOUT	ADC123_IN1
16	J10	25	36	P2	42	PA2	I/O	FT	(4)	USART2_TX/TIM5_CH3 / TIM9_CH1 / TIM2_CH3 / ETH_MDIO/ EVENTOUT	ADC123_IN2
-	-	-	-	F4	43	PH2	I/O	FT		ETH_MII_CRS/EVENTOUT	
-	-	-	-	G4	44	PH3	I/O	FT		ETH_MII_COL/EVENTOUT	
-	-	-	-	H4	45	PH4	I/O	FT		I2C2_SCL / OTG_HS_ULPI_NXT/ EVENTOUT	

Memória térkép

0xFFFFFFFF	System level	Private peripherals including build-in interrupt controller (NVIC), MPU control registers, and debug components
0xE0000000		
0xDFFFFFFF	External device	Mainly used as external peripherals
0xA0000000		
0x9FFFFFFF	External RAM	Mainly used as external memory
0x60000000		
0x5FFFFFFF		
0x40000000	Peripherals	Mainly used as peripherals
0x3FFFFFFF		
0x20000000	SRAM	Mainly used as static RAM
0x1FFFFFFF		
0x00000000	CODE	Mainly used for program code. Also provides exception vector table after power up

