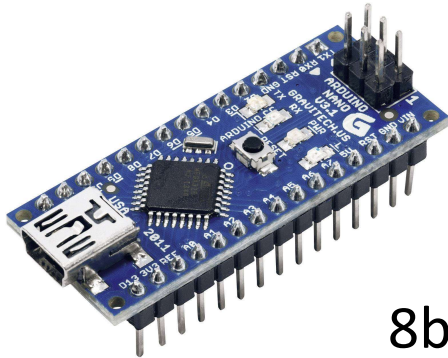


Development boards Overview

Aurel Gontean

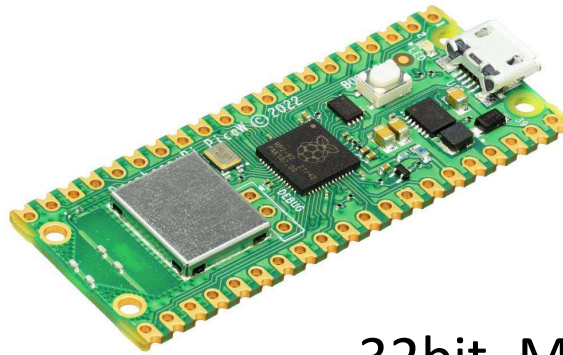
Microcontroller Development Boards



8bit

Arduino

Arduino +	Arduino -
Inexpensive	No debugger
Many examples	Poor learning ramp
Many libraries	Complex tasks needs datasheet
Arduino IDE	Arduino IDE
Simple examples = no need for datasheet understanding	

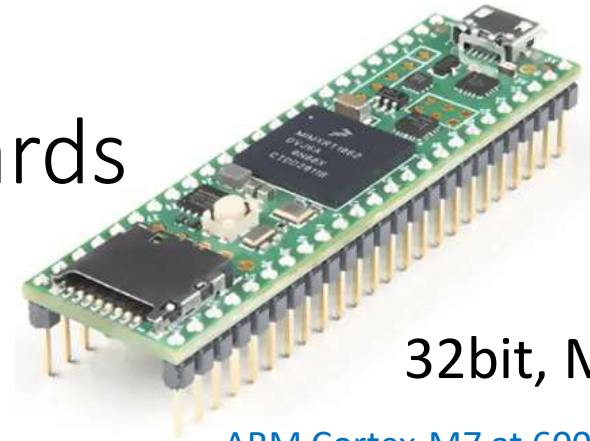


32bit, M0

RP2040 (dual-core Arm Cortex-M0
at 133MHz)

Raspberry Pico W

264KB RAM
2MB (on-board QSPI flash)
26 GPIO pins, 3 analog inputs
2× UART, 2× SPI controllers, 2× I2C
16× PWM channels, 1× USB 1.1
2.4GHz 802.11b/g/n Wi-Fi
Inexpensive / Own IDE



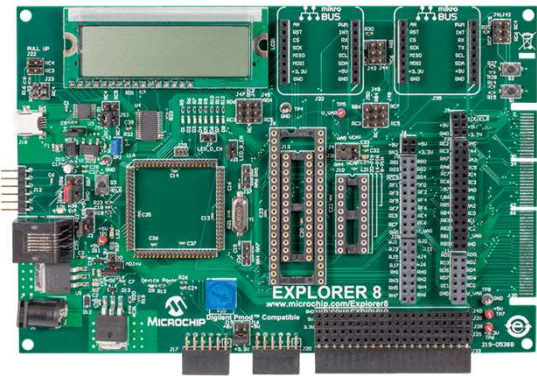
32bit, M7

ARM Cortex-M7 at 600 MHz

Teensy 4.1

FPU, 64 & 32 bits
7936K Flash, 1024K RAM, 4K EEPROM (em)
55 digital IOs, 35 PWM, 18 analog inputs
8 serial, 3 SPI, 3 I2C ports
2 I2S/TDM and 1 S/PDIF digital audio port
3 CAN Bus (1 with CAN FD)
1 SDIO (4 bit) native SD Card port
Ethernet 10/100 Mbit with DP83825 PHY
32 general purpose DMA channels
RTC for date/time
Arduino IDE, Python, ...
Inexpensive / **hardly available**

Microchip microcontroller development boards



Explorer 8

8-bit CPs

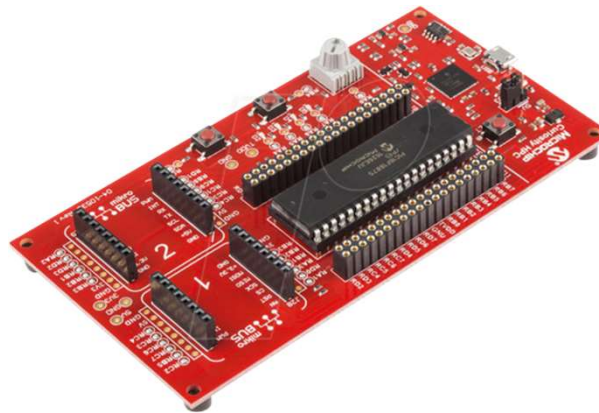
Expensive

Versatile

Debugger

MPLAB X

C coding



Curiosity

8/16-bit versions

Medium Expensive

Medium versatile

No external debugger

MPLAB X

C coding / MCC



Xpress

8 / 16 bit versions

Inexpensive

Only MCU!

Breadboard needed

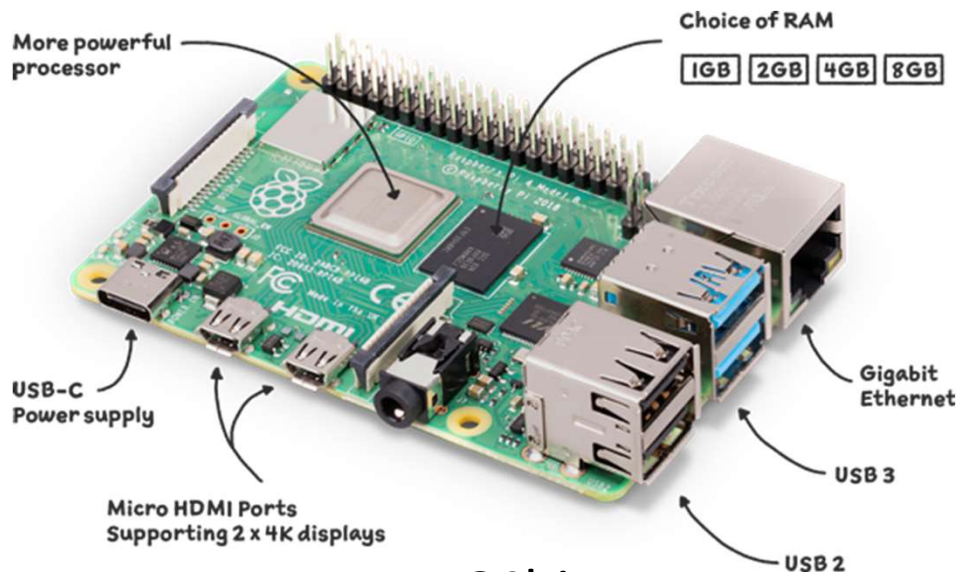
No debugging, just

programming via .hex file

MPLAB X / MPLAB Xpress

C coding / MCC

Raspberry Pi 4B Microprocessor Board



64bit

Quad core Cortex-A72 @ 1.5GHz

Broadcom BCM2711
8GB LPDDR4-3200 SDRAM
2.4 & 5.0 GHz IEEE 802.11ac wireless
Bluetooth 5.0, BLE
Gigabit Ethernet
2 USB 3.0 ports; 2 USB 2.0 ports
Standard 40 pin GPIO header (see next slide)
4-pole stereo audio and composite video port
2 micro-HDMI ports (up to 4kp60 supported)
2-lane MIPI DSI display port, 2-lane MIPI CSI camera port
H.265 (4kp60 decode),
H264 (1080p60 decode, 1080p30 encode)
MicroSD card (mandatory)

Raspberry Pi 4B (continued)

5V with **3A minimum**

40 Pin connector

- 28 digital I/O Pins (no analog inputs)
- 1 x SPI, 2 x I²C, 1 x UART, 4 x PWM

Raspberry Pi 4 B J8 GPIO Header

Pin#	NAME		NAME	Pin#
01	3.3v DC Power	■	DC Power 5v	02
03	GPIO02 (SDA1, I ² C)	●	DC Power 5v	04
05	GPIO03 (SCL1, I ² C)	●	Ground	06
07	GPIO04 (GPCLK0)	●	(TXD0, UART) GPIO14	08
09	Ground	●	(RXD0, UART) GPIO15	10
11	GPIO17	●	(PWM0) GPIO18	12
13	GPIO27	●	Ground	14
15	GPIO22	●	GPIO23	16
17	3.3v DC Power	■	GPIO24	18
19	GPIO10 (SPI0_MOSI)	●	Ground	20
21	GPIO09 (SPI0_MISO)	●	GPIO25	22
23	GPIO11 (SPI0_CLK)	●	(SPI0_CE0_N) GPIO08	24
25	Ground	●	(SPI0_CE1_N) GPIO07	26
27	GPIO00 (SDA0, I ² C)	●	(SCL0, I ² C) GPIO01	28
29	GPIO05	●	Ground	30
31	GPIO06	●	(PWM0) GPIO12	32
33	GPIO13 (PWM1)	●	Ground	34
35	GPIO19	●	GPIO16	36
37	GPIO26	●	GPIO20	38
39	Ground	●	GPIO21	40

Raspberry Pi 4 B J14 PoE Header

01	TR01	●	TR00	02
03	TR03	●	TR02	04

Pinout Grouping Legend

Inter-Integrated Circuit Serial Bus	●	●	Serial Peripheral Interface Bus
Ungrouped/Un-Allocated GPIO	●	●	Universal Asynchronous Receiver-Transmitter
Reserved for EEPROM	●		

Rev. 2
19/06/2019 CGS

www.element14.com/RaspberryPi

Other microcontroller boards

- ESP32 Microcontroller Board (32 bit)
- ESP8266 Microcontroller Board (32 bit)
- STM32F103C8T6 Microcontroller Board (32 bit)

SparkFun RED-V RedBoard, SiFive RISC-V FE310 SoC

Features:

Arduino R3 Footprint

CPU: 256 MHz, 320MHz (turbo)

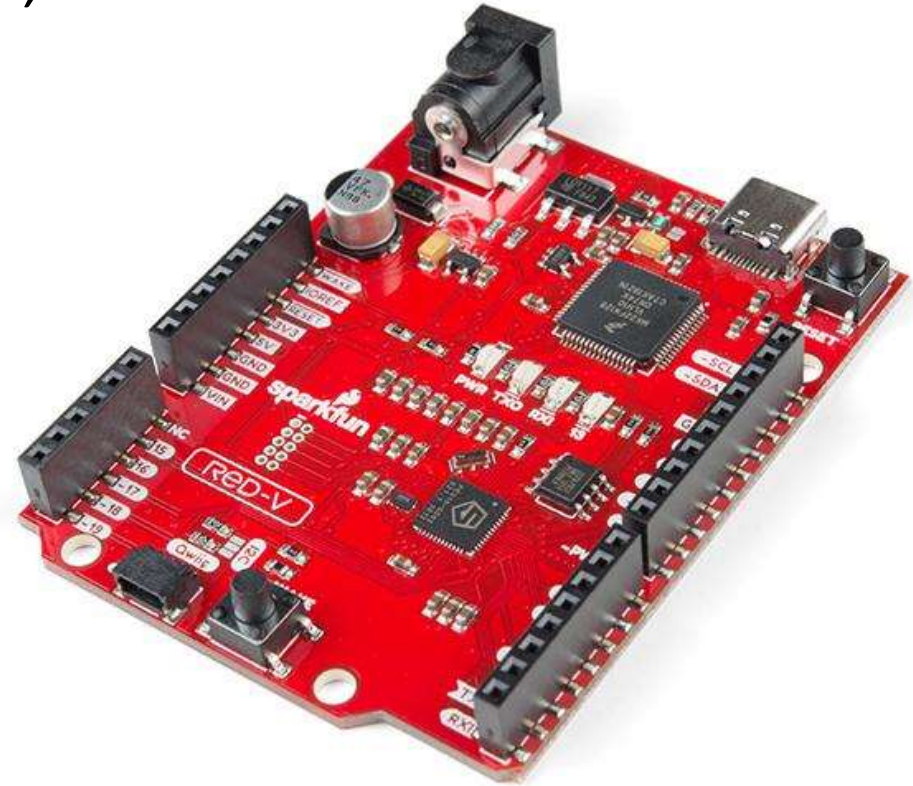
- 16 KB Instruction Cache, 16 KB Data Scratchpad
- HW-Multiply/Division, Debug-Module

19 digital Pins, 9 PWM-Pins, **no analog input**

SPI-Controller/HW CS-Pins: 1/3

Interrupt-Pins: 19

Wakeup-Pins: 1 (& Taster)



32bit, RISC-V

SiFive Freedom E310 @ 256 MHz

CPU performance evolution

