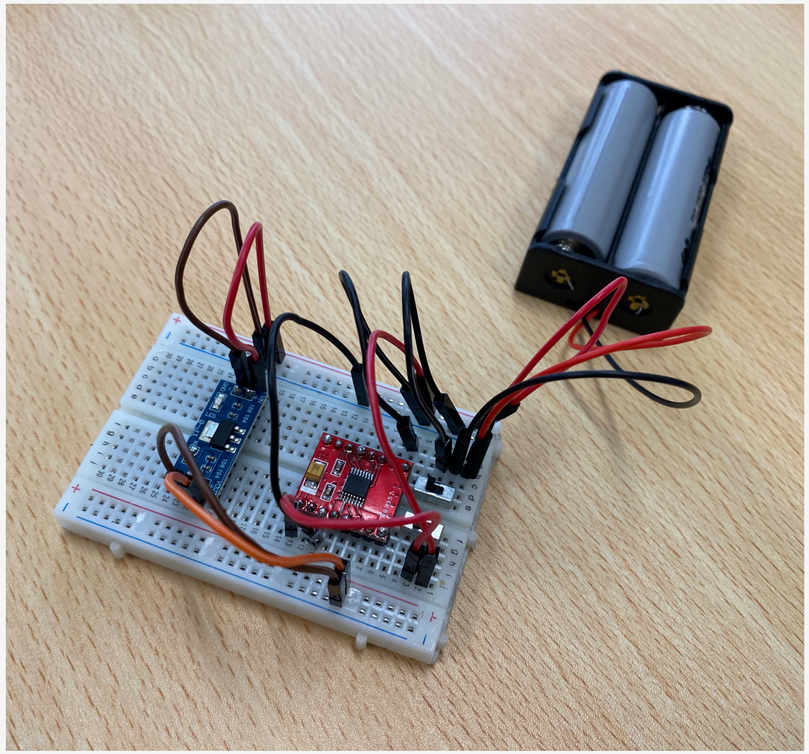
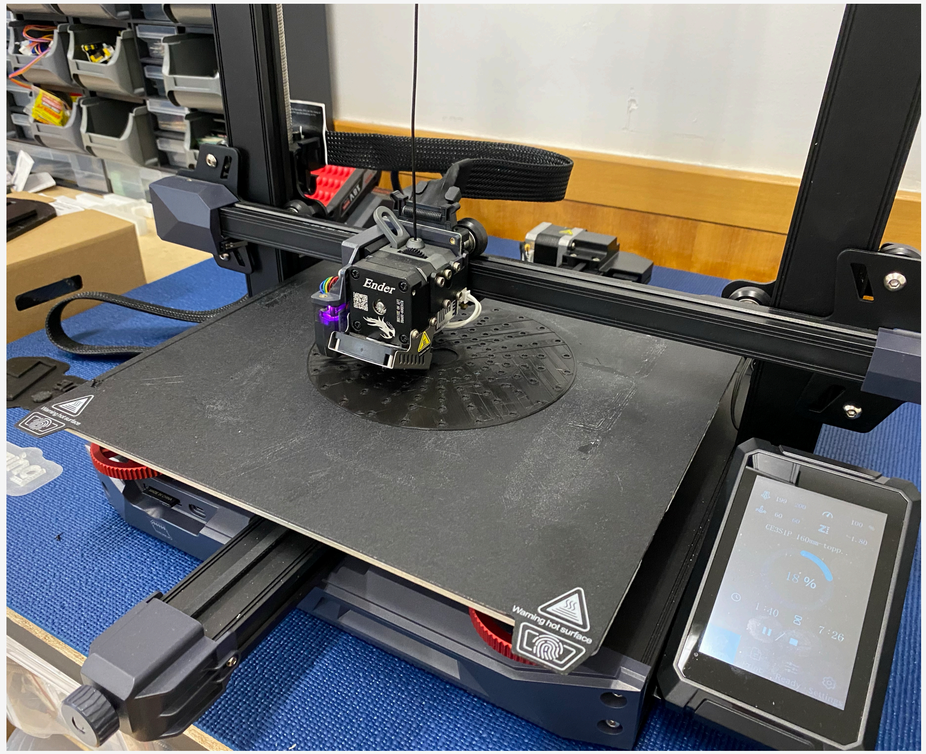

amazing
robots

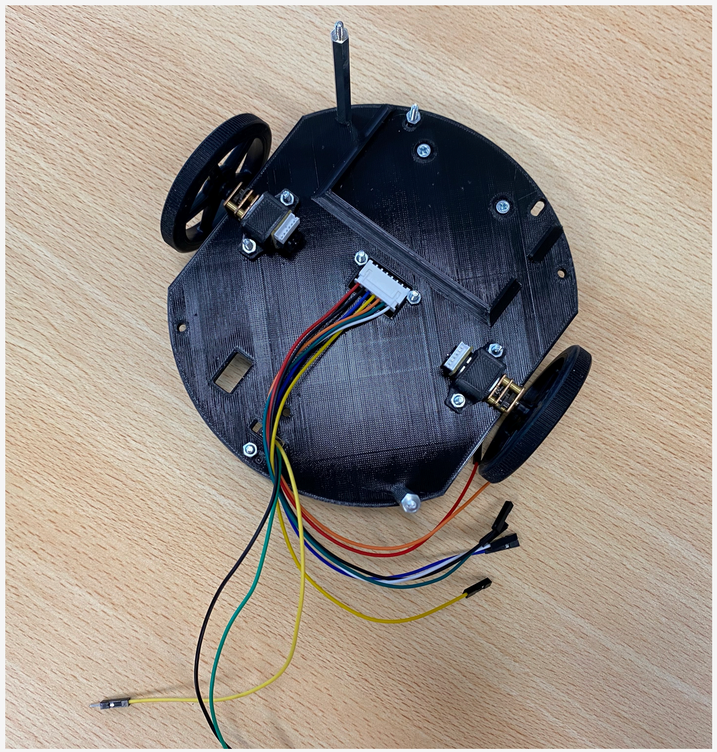
Amazing Robots Bootcamp

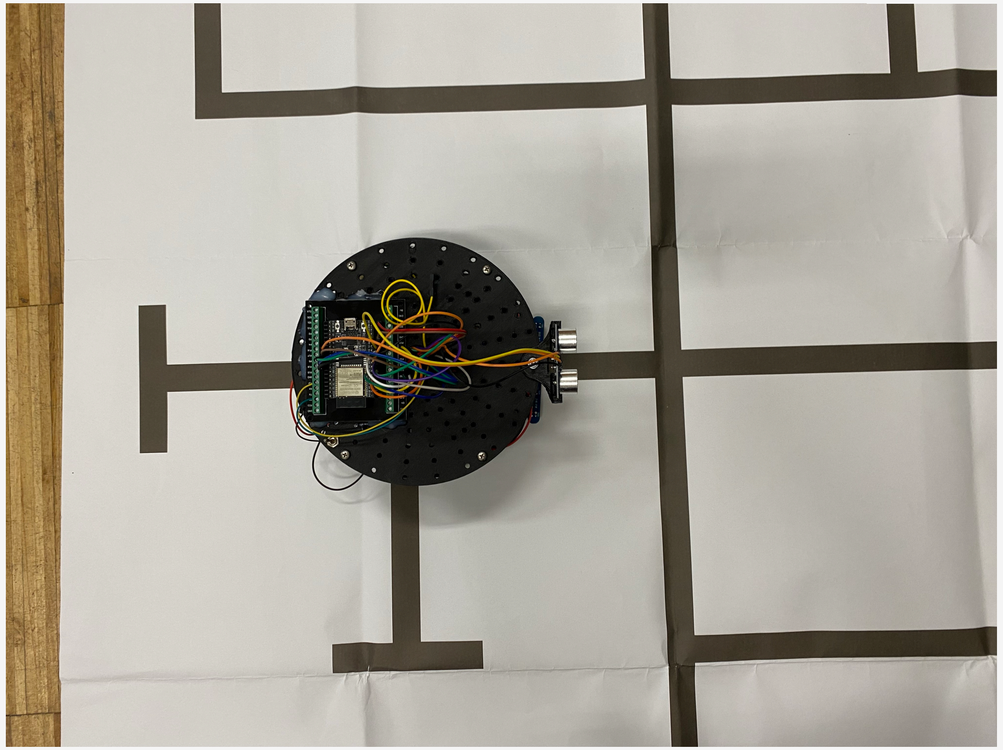
João Macedo

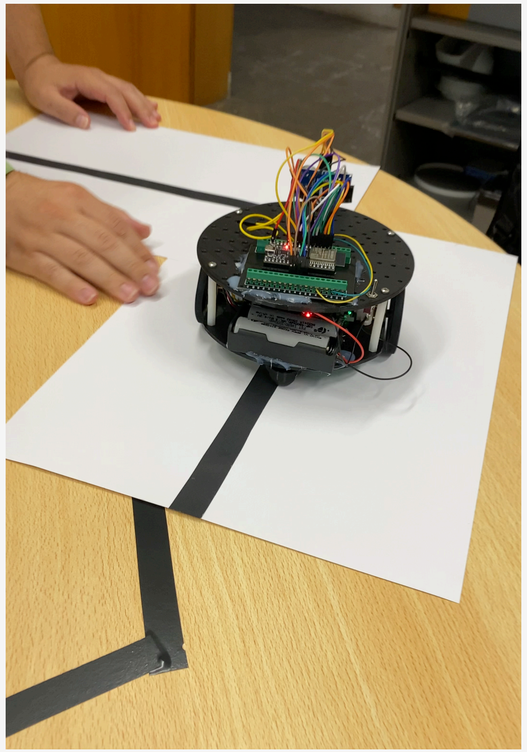
O Que Podem Esperar?

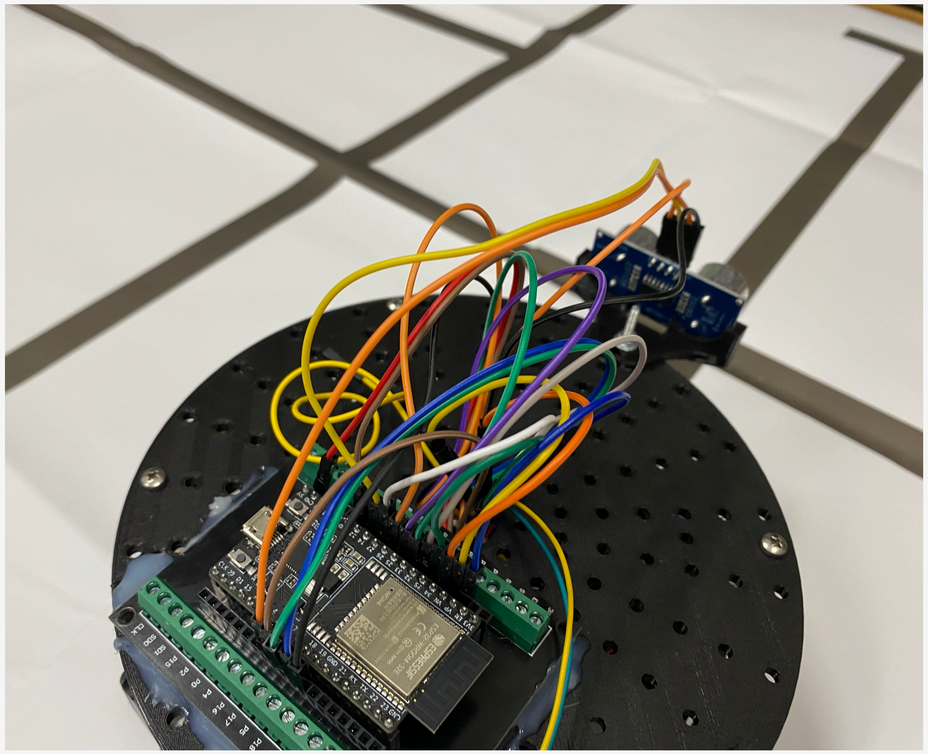



Ender
Warning! hot surface









Programa

2 SETEMBRO

9H30—12H30

O que é um robô?

12H30—14H00

Almoço

14H00—17H00

Sensores

3 SETEMBRO

9H30—12H30

Actuadores

12H30—14H00

Almoço

14H00—17H00

Desenho e Impressão 3D

4 + 5 SETEMBRO

TODO O DIA

Apoio ao desenvolvimento dos robôs

12H30—14H00

Almoço

6 SETEMBRO

9H30—12H30

Desafio

12H30—14H00

Almoço

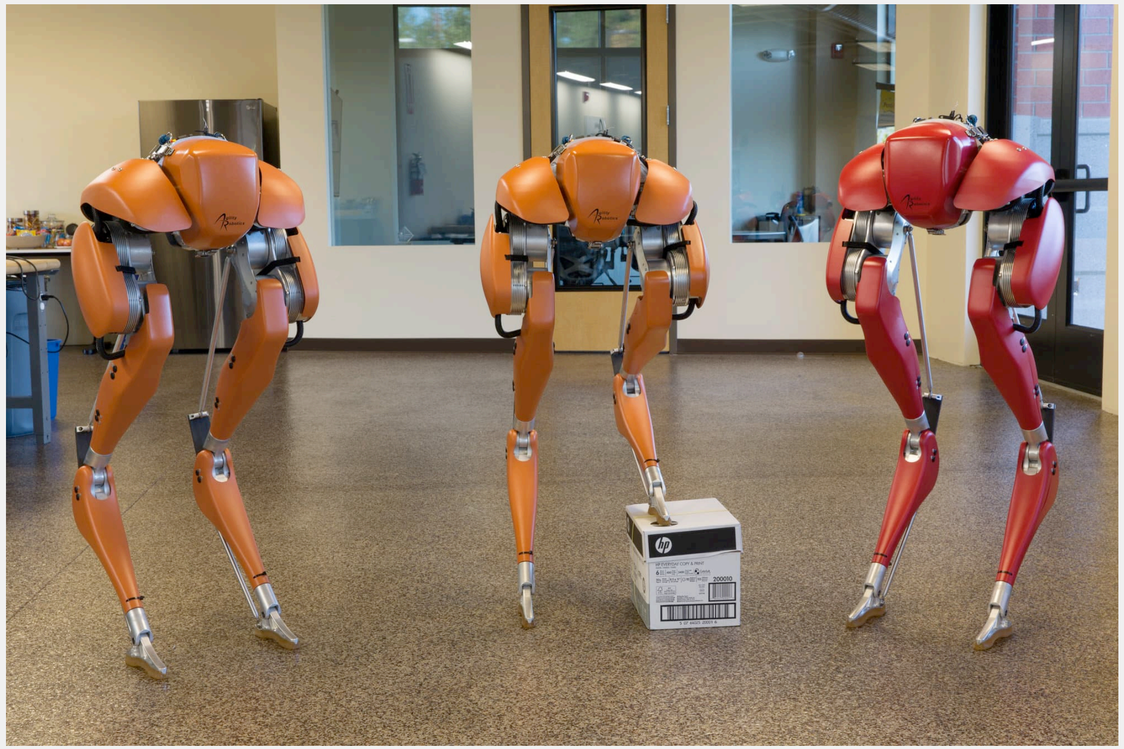
14H00—15H00

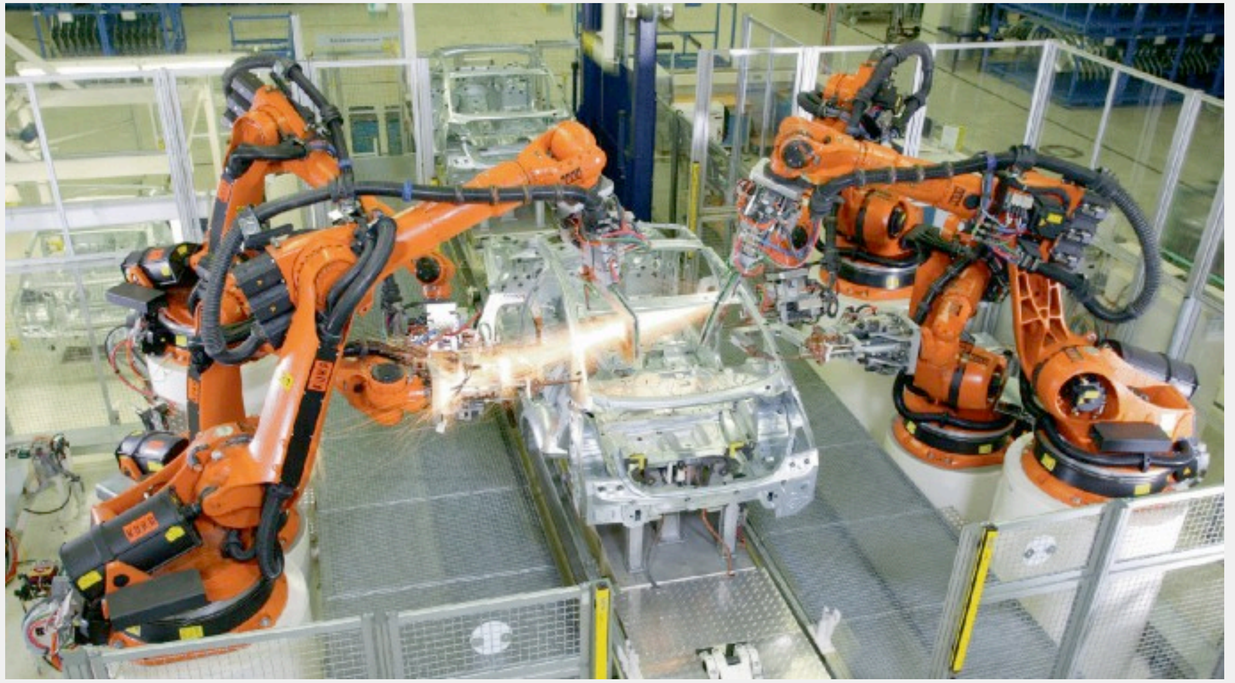
Entrega de Prémios

Tipos de robôs

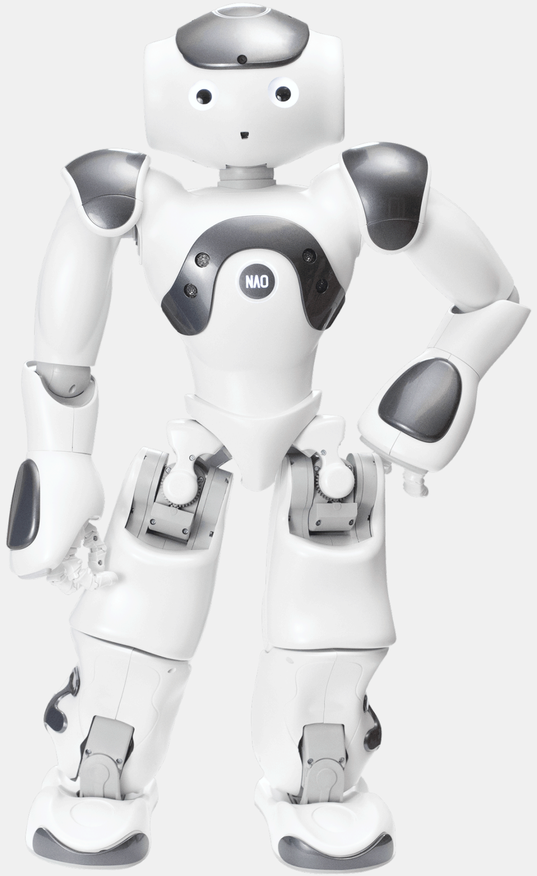

HOW MAY I HELP YOU?
temi

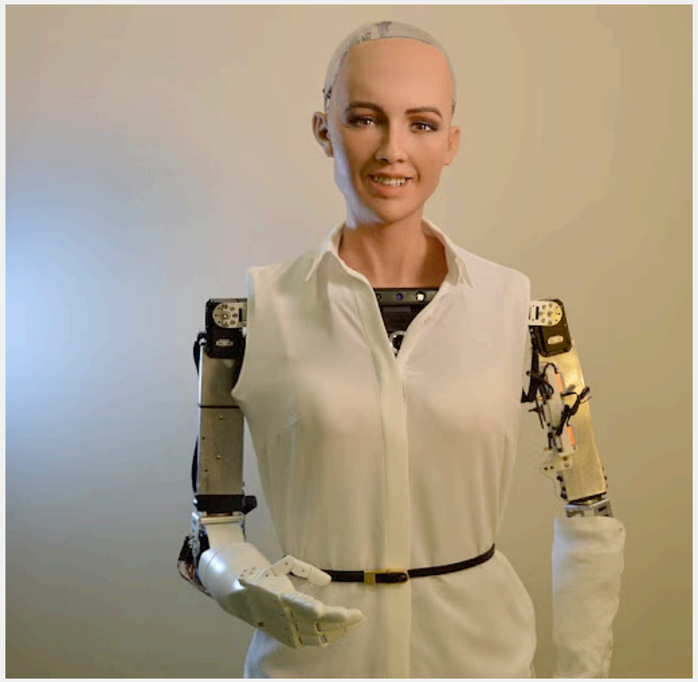

tonDynamics

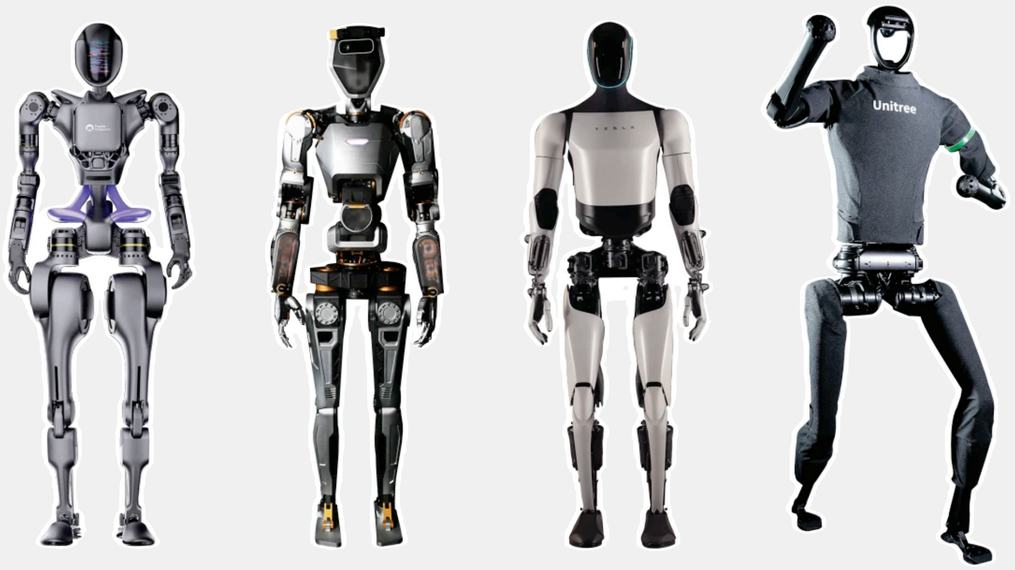




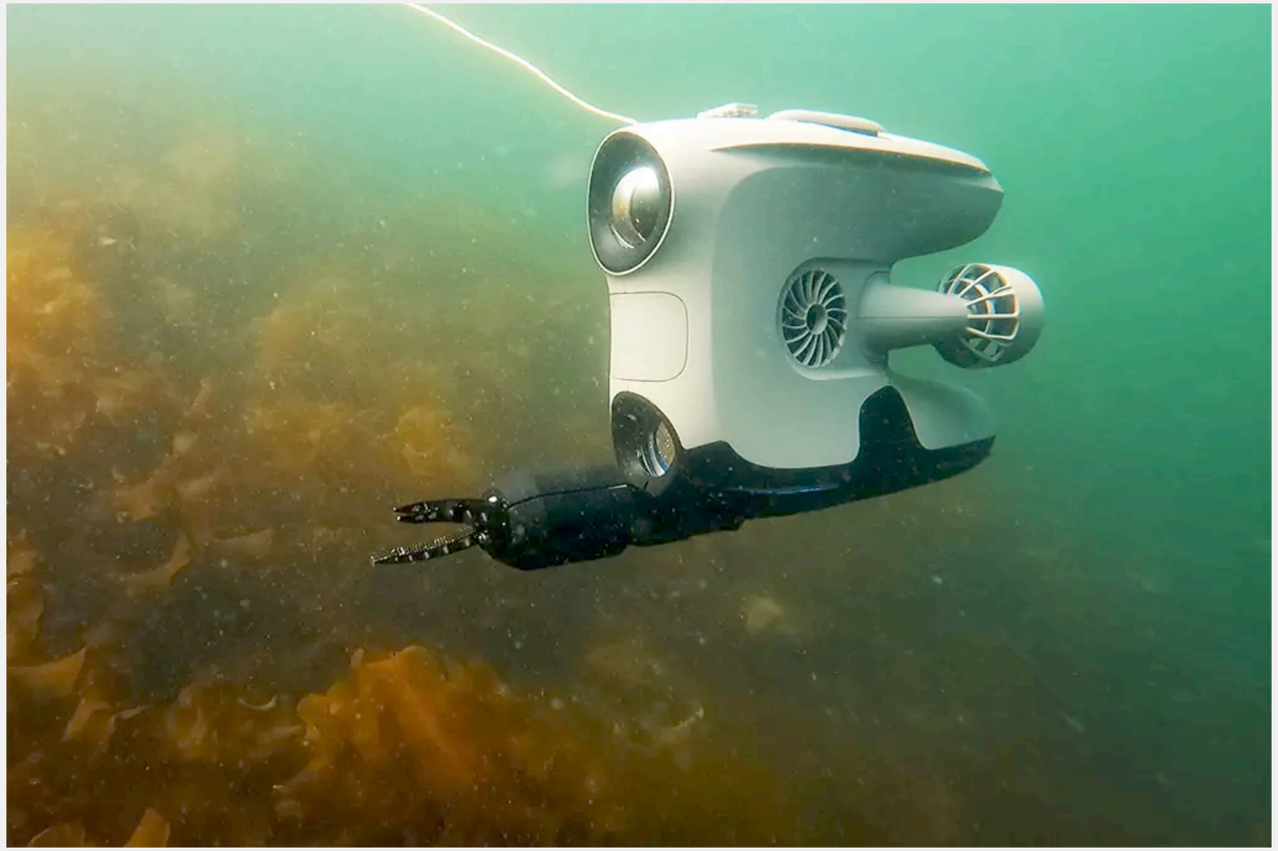

WAYPOINT
VECTOR

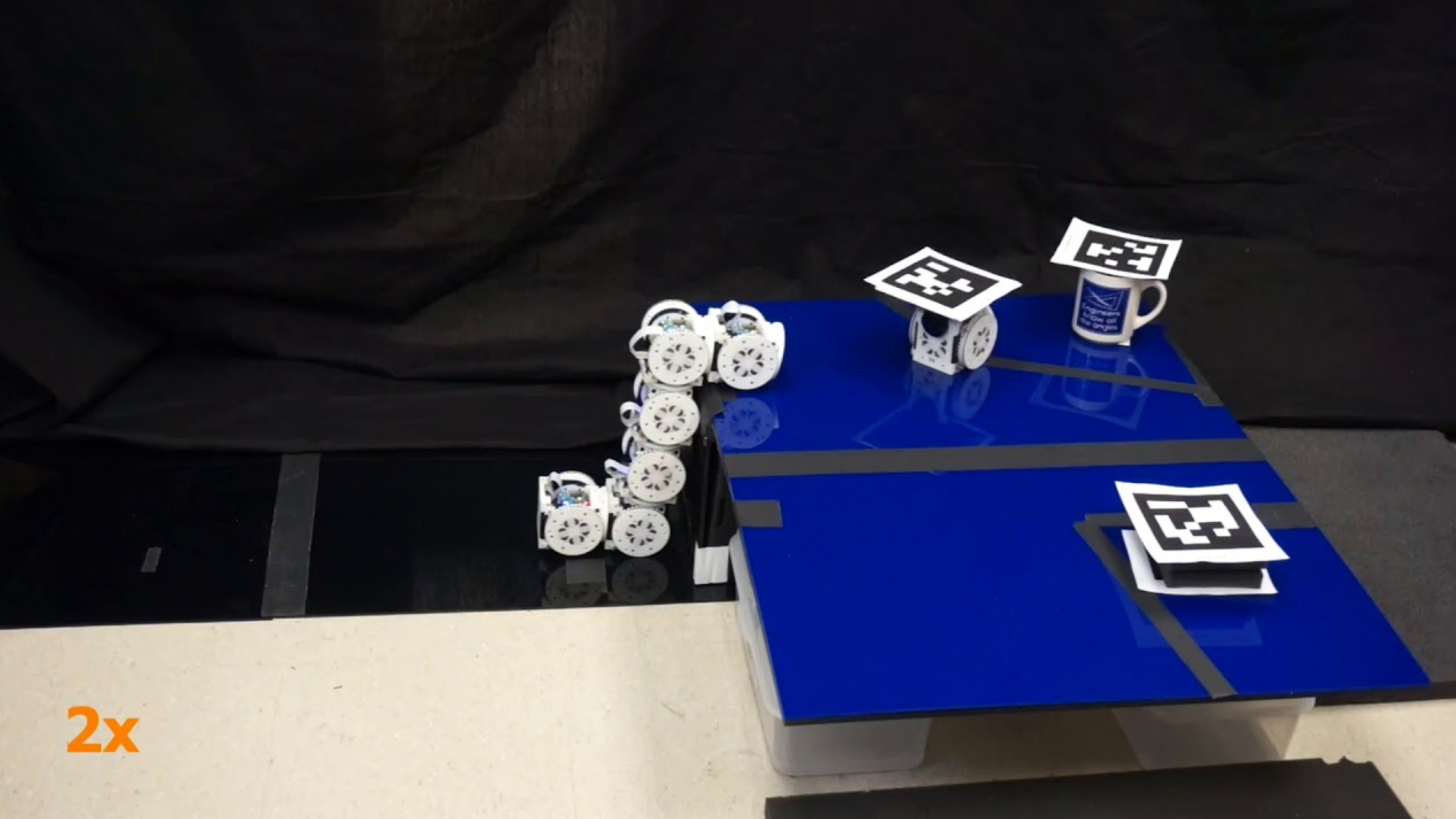

NAO




Unitree


ASV

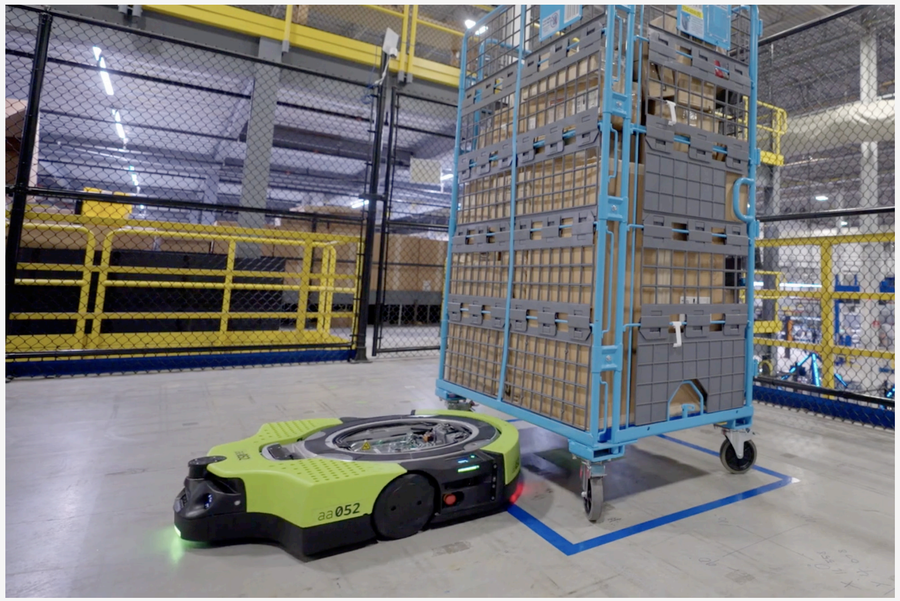



2x

Robôs em todo o lado

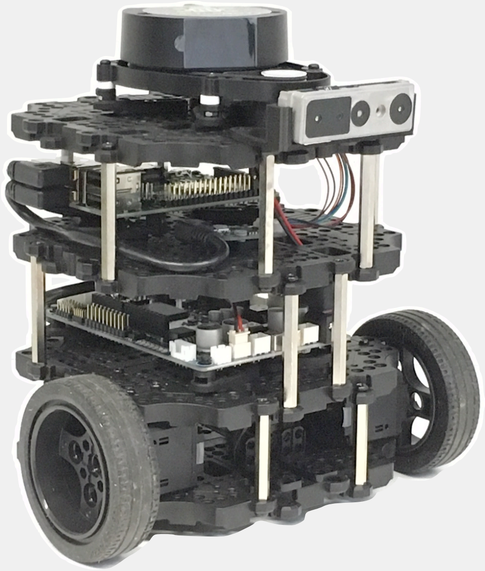
Robôs em casa

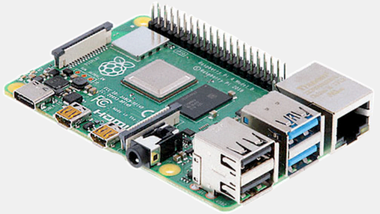
Robôs na industria (Amazon)

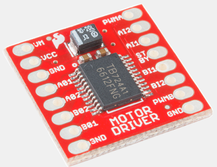


Robôs no mundo

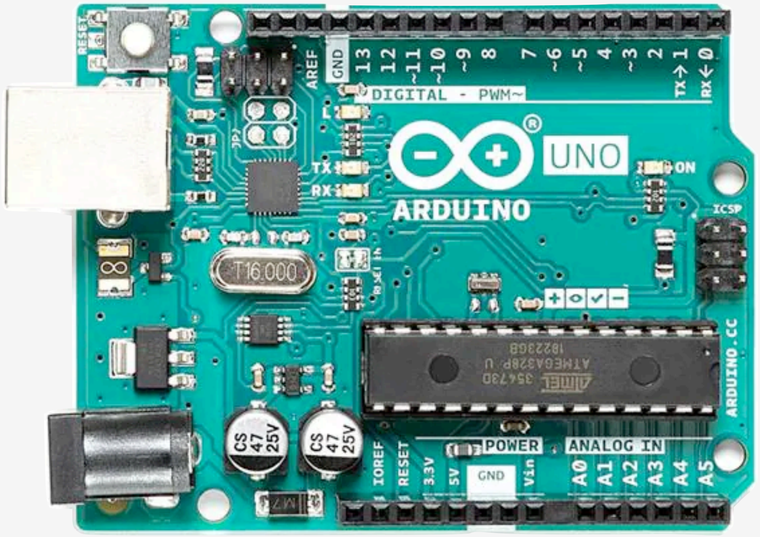
O que é um robô?

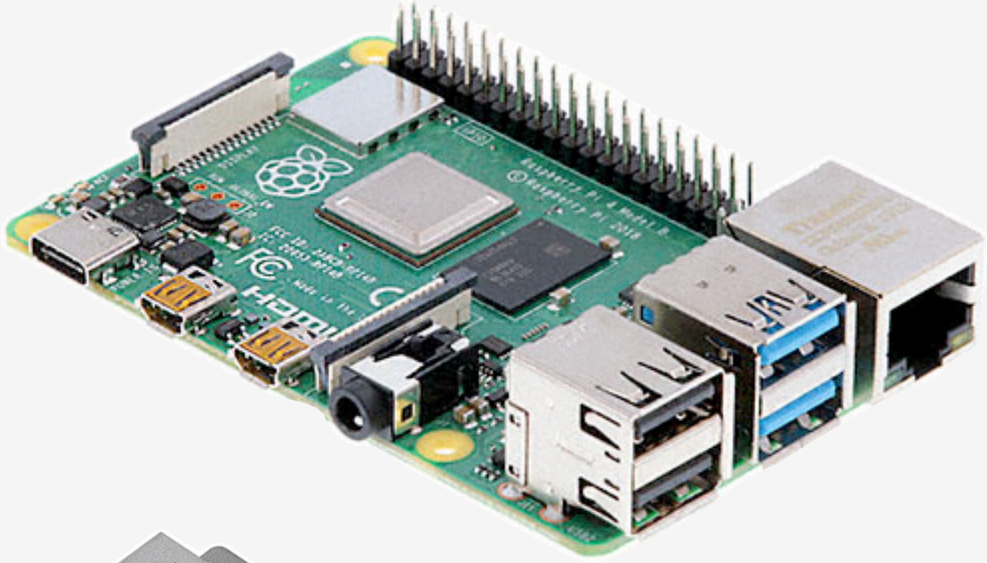


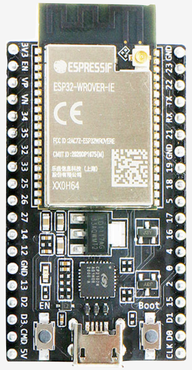




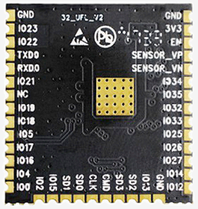
Computação física

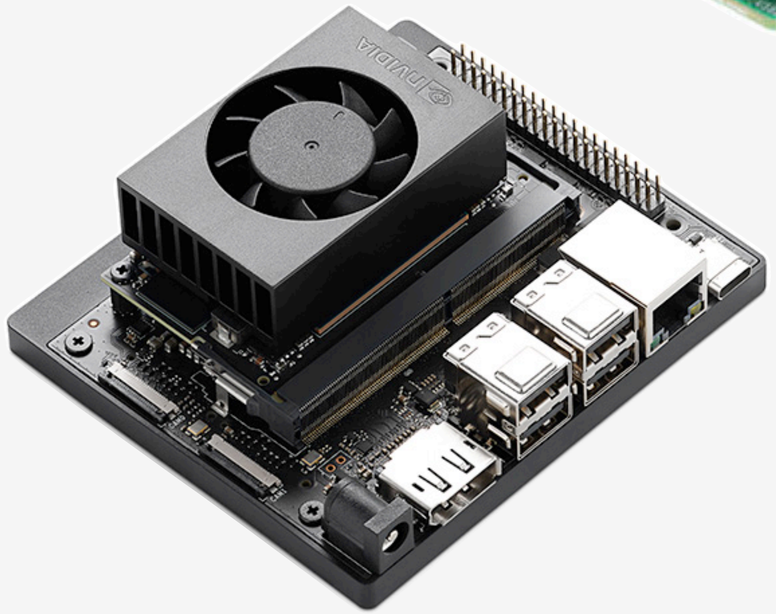

UNO
ARDUINO
DIGITAL - PWM~
POWER
ANALOG IN
ARDUINO.CC



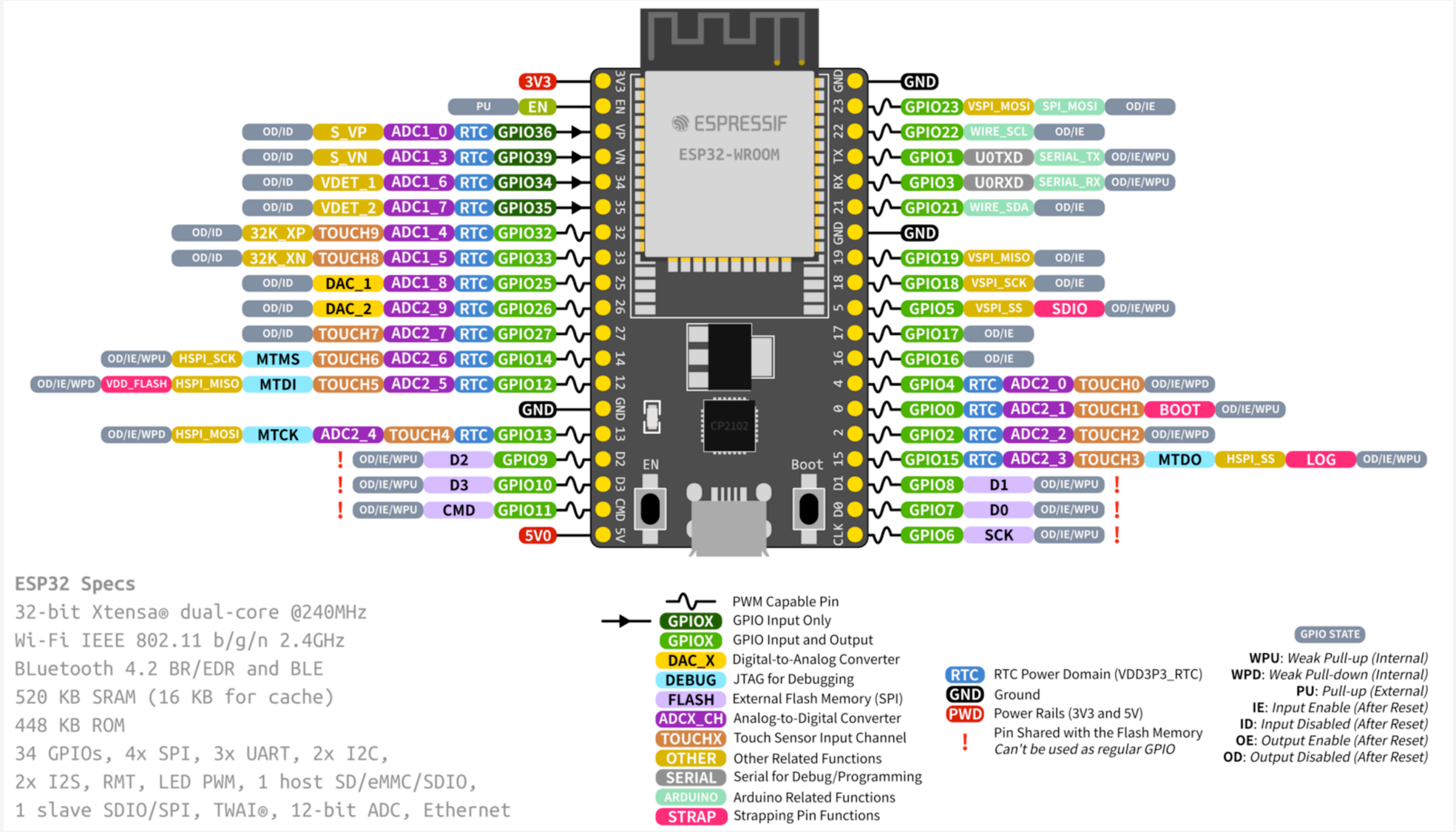

ESPRESSIF
ESP32-WROVER-IE
Boot


ESPRESSIF
ESP32-WROOM-32U



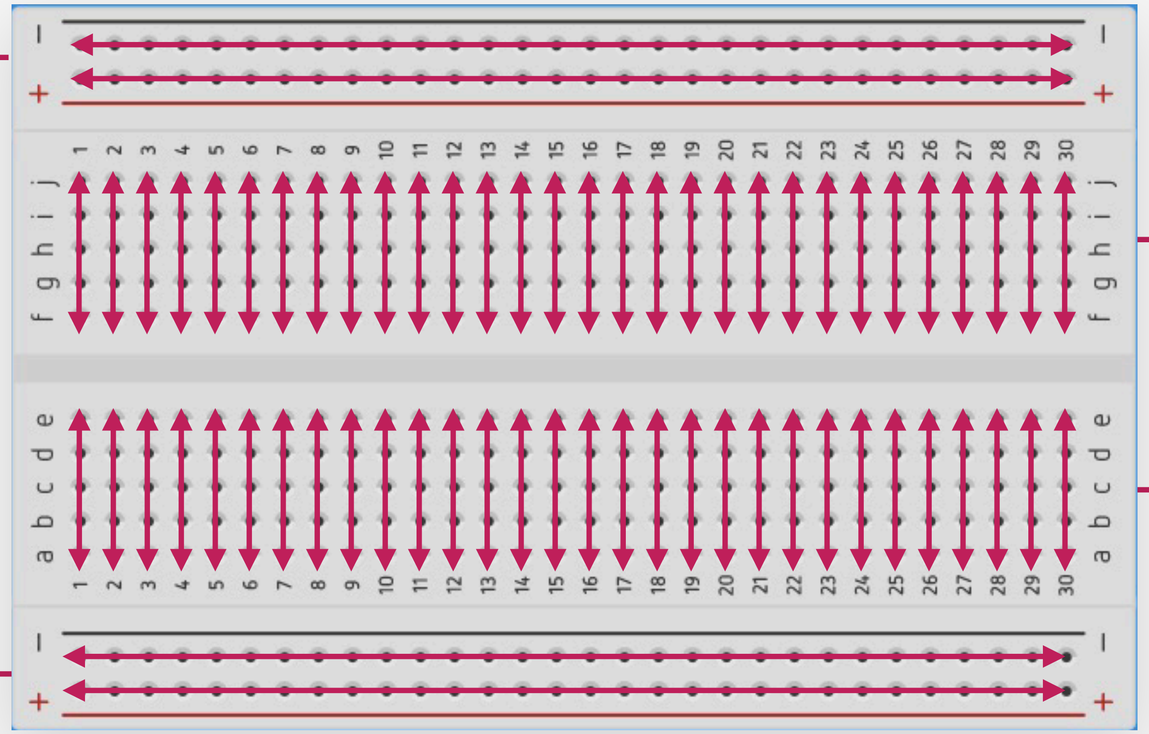

NVIDIA

ESP32


ESPRESSIF
ESP32-WROOM
CP2102
EN
Boot
3V3
PU EN
OD/ID S_VP ADC1_0 RTC GPIO36
OD/ID S_VN ADC1_3 RTC GPIO39
OD/ID VDET_1 ADC1_6 RTC GPIO34
OD/ID VDET_2 ADC1_7 RTC GPIO35
OD/ID 32K_XP TOUCH9 ADC1_4 RTC GPIO32
OD/ID 32K_XN TOUCH8 ADC1_5 RTC GPIO33
OD/ID DAC_1 ADC1_8 RTC GPIO25
OD/ID DAC_2 ADC2_9 RTC GPIO26
OD/ID TOUCH7 ADC2_7 RTC GPIO27
OD/IE/WPU HSPI_SCK MTMS TOUCH6 ADC2_6 RTC GPIO14
OD/IE/WPD VDD_FLASH HSPI_MISO MTDI TOUCH5 ADC2_5 RTC GPIO12
GND
OD/IE/WPD HSPI_MOSI MTCK ADC2_4 TOUCH4 RTC GPIO13
! OD/IE/WPU D2 GPIO9
! OD/IE/WPU D3 GPIO10
! OD/IE/WPU CMD GPIO11
5V0
GND
GPIO23 VSPI_MOSI SPI_MOSI OD/IE
GPIO22 WIRE_SCL OD/IE
GPIO1 U0TXD SERIAL_TX OD/IE/WPU
GPIO3 U0RXD SERIAL_RX OD/IE/WPU
GPIO21 WIRE_SDA OD/IE
GND
GPIO19 VSPI_MISO OD/IE
GPIO18 VSPI_SCK OD/IE
GPIO5 VSPI_SS SDIO OD/IE/WPU
GPIO17 OD/IE
GPIO16 OD/IE
GPIO4 RTC ADC2_0 TOUCH0 OD/IE/WPD
GPIO0 RTC ADC2_1 TOUCH1 BOOT OD/IE/WPU
GPIO2 RTC ADC2_2 TOUCH2 OD/IE/WPD
GPIO15 RTC ADC2_3 TOUCH3 MTDO HSPI_SS LOG OD/IE/WPU
GPIO8 D1 OD/IE/WPU !
GPIO7 D0 OD/IE/WPU !
GPIO6 SCK OD/IE/WPU !
ESP32 Specs
32-bit Xtensa® dual-core @240MHz
Wi-Fi IEEE 802.11 b/g/n 2.4GHz
BLuetooth 4.2 BR/EDR and BLE
520 KB SRAM (16 KB for cache)
448 KB ROM
34 GPIOs, 4x SPI, 3x UART, 2x I2C,
2x I2S, RMT, LED PWM, 1 host SD/eMMC/SDIO,
1 slave SDIO/SPI, TWAI®, 12-bit ADC, Ethernet
PWM Capable Pin
GPIOX GPIO Input Only
GPIOX GPIO Input and Output
DAC_X Digital-to-Analog Converter
DEBUG JTAG for Debugging
FLASH External Flash Memory (SPI)
ADCX_CH Analog-to-Digital Converter
TOUCHX Touch Sensor Input Channel
OTHER Other Related Functions
SERIAL Serial for Debug/Programming
ARDUINO Arduino Related Functions
STRAP Strapping Pin Functions
RTC RTC Power Domain (VDD3P3_RTC)
GND Ground
PWD Power Rails (3V3 and 5V)
! Pin Shared with the Flash Memory
Can't be used as regular GPIO
GPIO STATE
WPU: Weak Pull-up (Internal)
WPD: Weak Pull-down (Internal)
PU: Pull-up (External)
IE: Input Enable (After Reset)
ID: Input Disabled (After Reset)
OE: Output Enable (After Reset)
OD: Output Disabled (After Reset)

Anatomia de uma breadboard

Estes pinos conectam entre si na horizontal

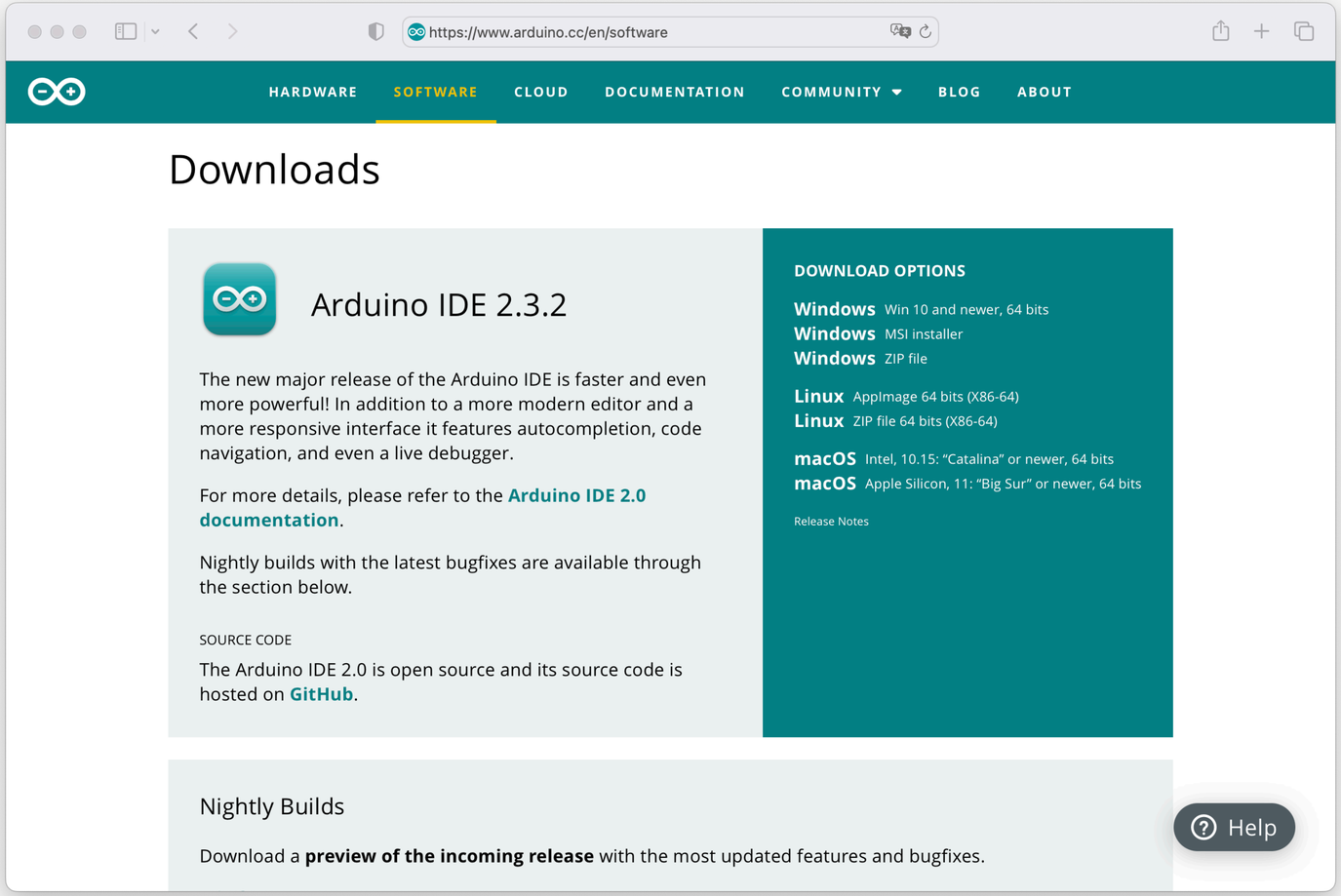


Estes pinos conectam entre si na vertical

Como começar?

Arduino IDE

Instalar Arduino IDE:
www.arduino.cc/en/software



Arduino IDE

Plataforma de prototipagem eletrónica baseada em *open source*

Hardware e software flexíveis e fáceis de usar

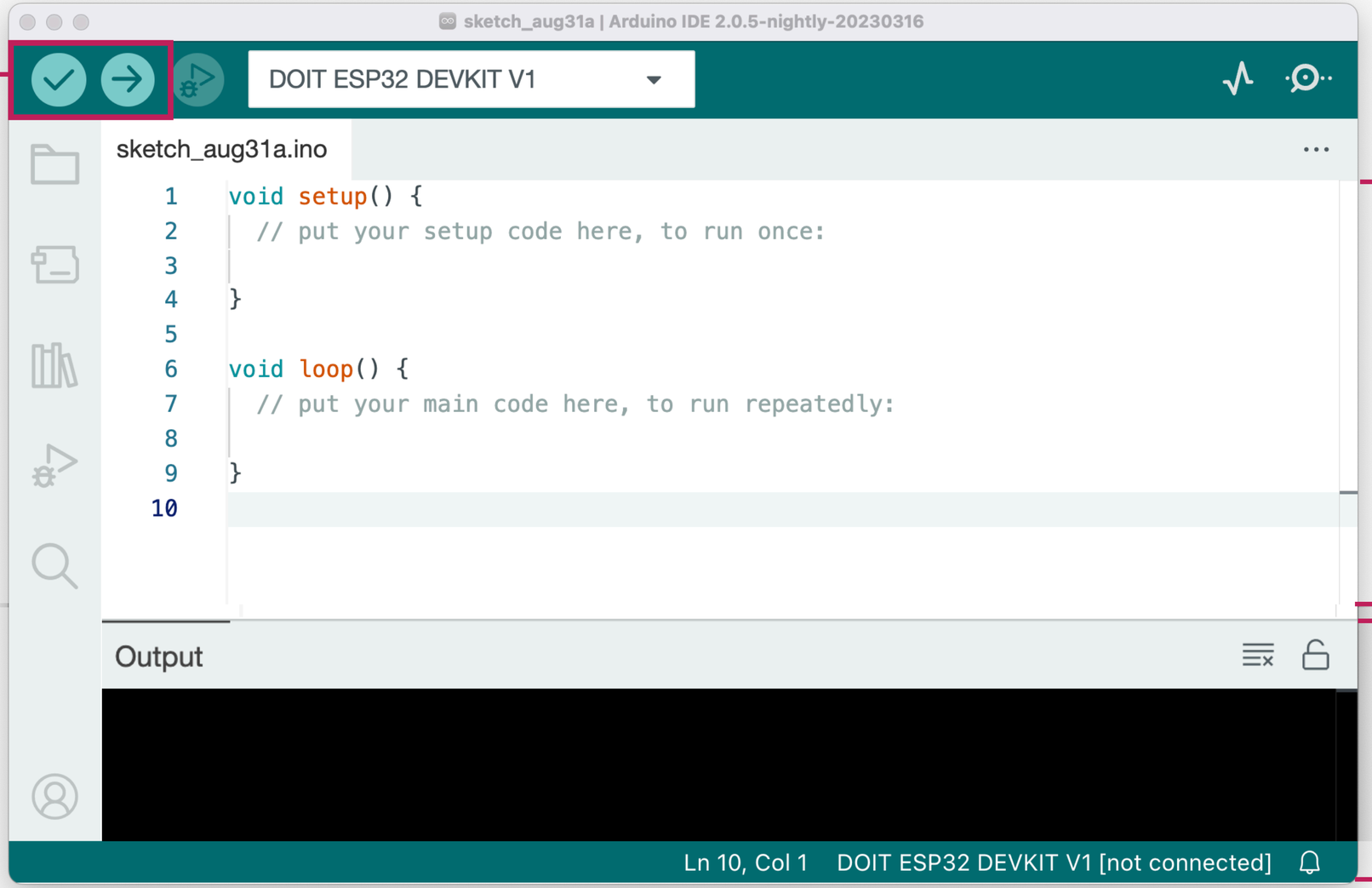
Ambiente de desenvolvimento multiplataforma (Windows, Linux, Macintosh)

Destinado a todos os interessados na criação de protótipos, invenções e todo o tipo de artefactos

Usa uma linguagem baseada no padrão C

Arduino IDE

Botões
de compilação
e execução
do programa
na placa

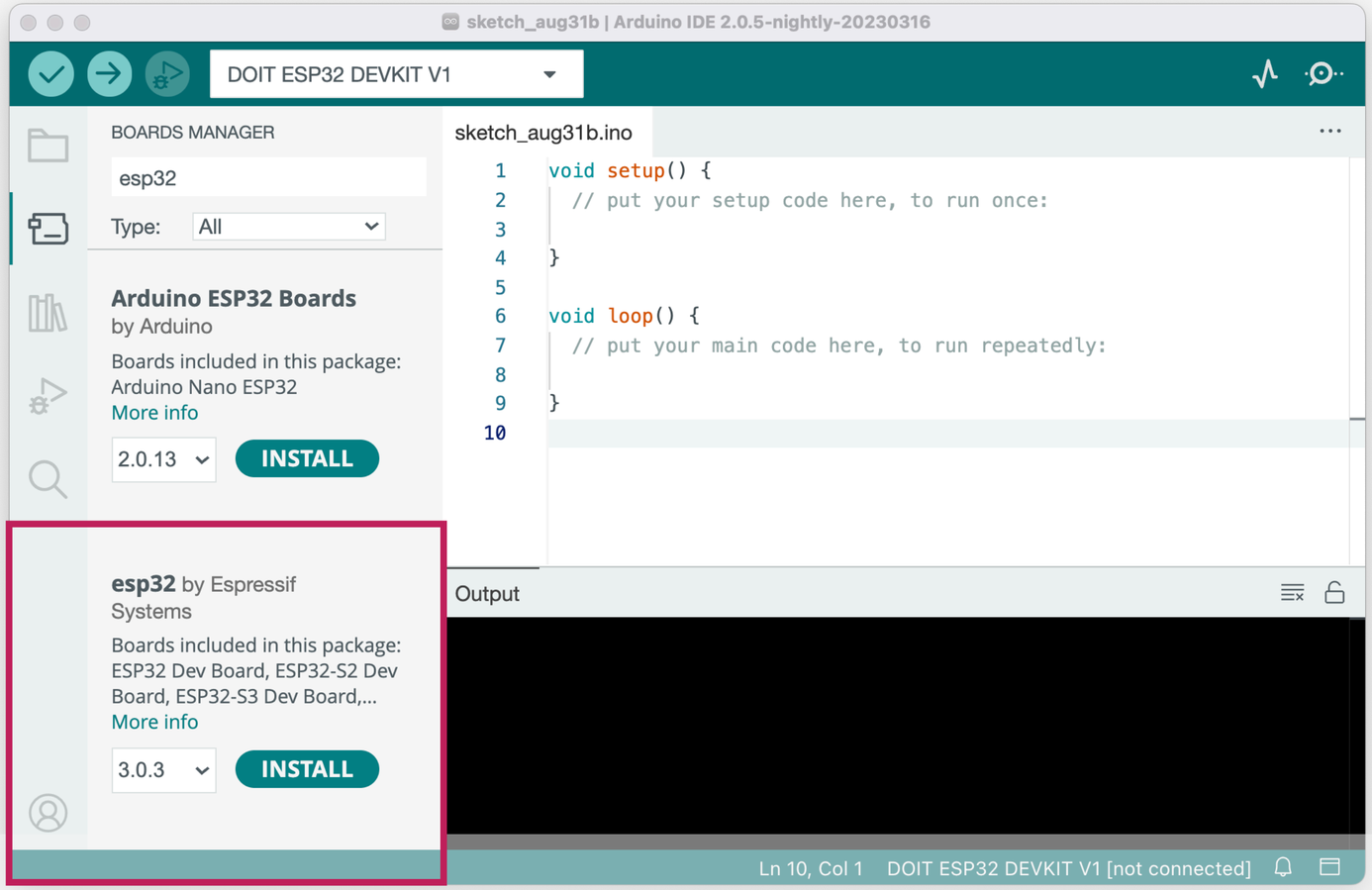


Janela
de edição
do código

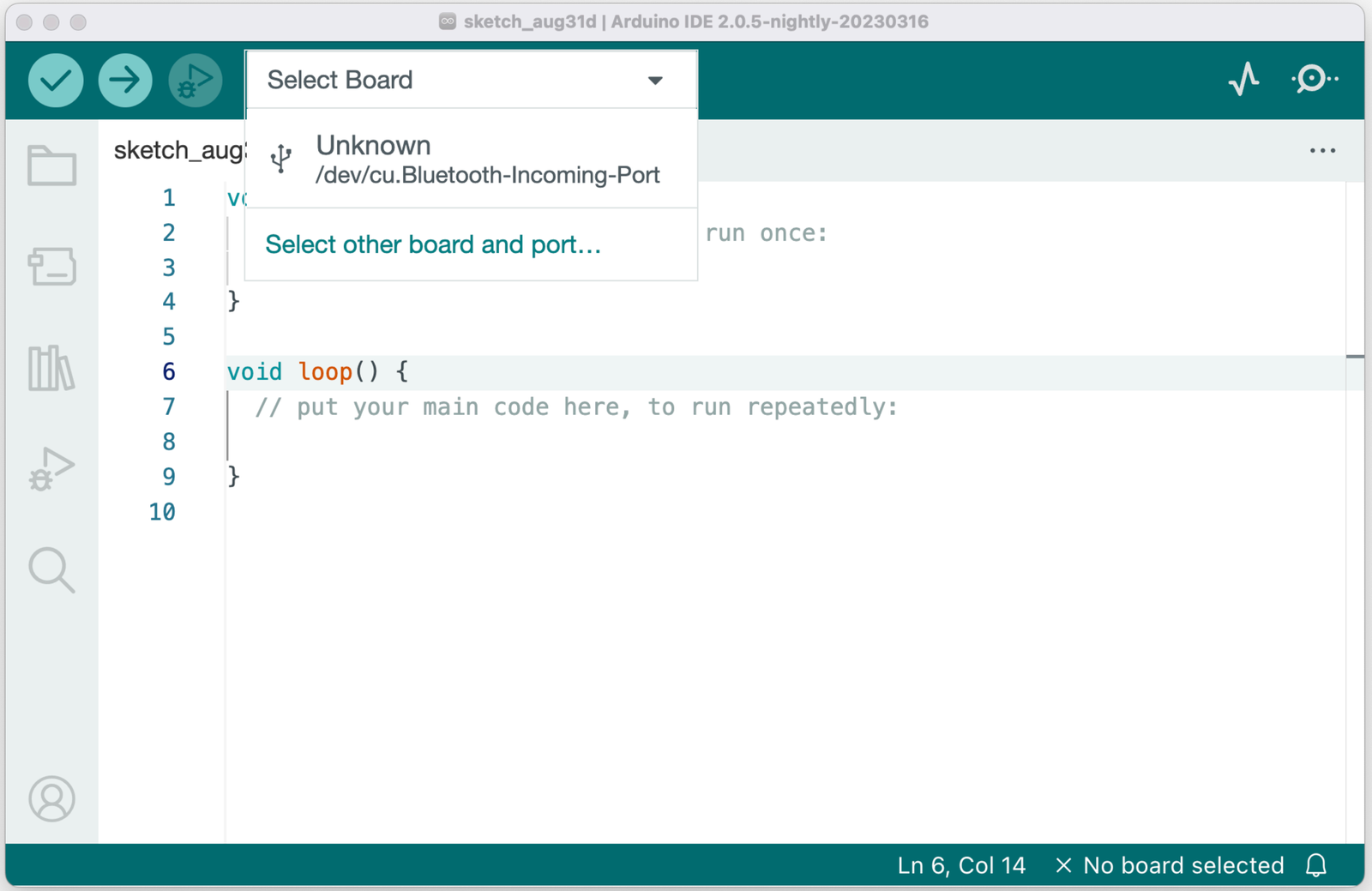
Consola com
informação
do estado,
erros, aviso
das operações

Arduino IDE

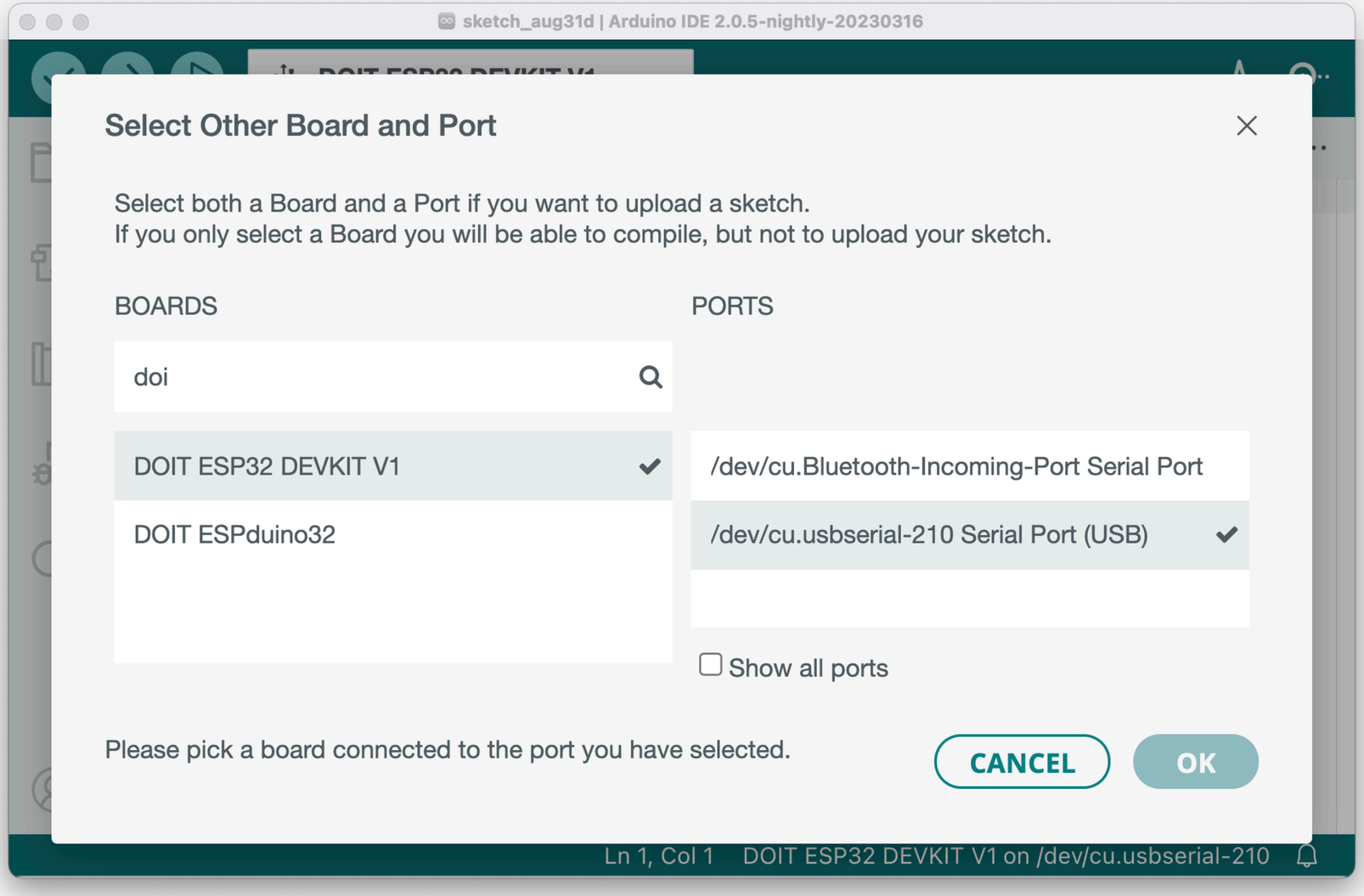
Tools -> Board -> Boards Manager



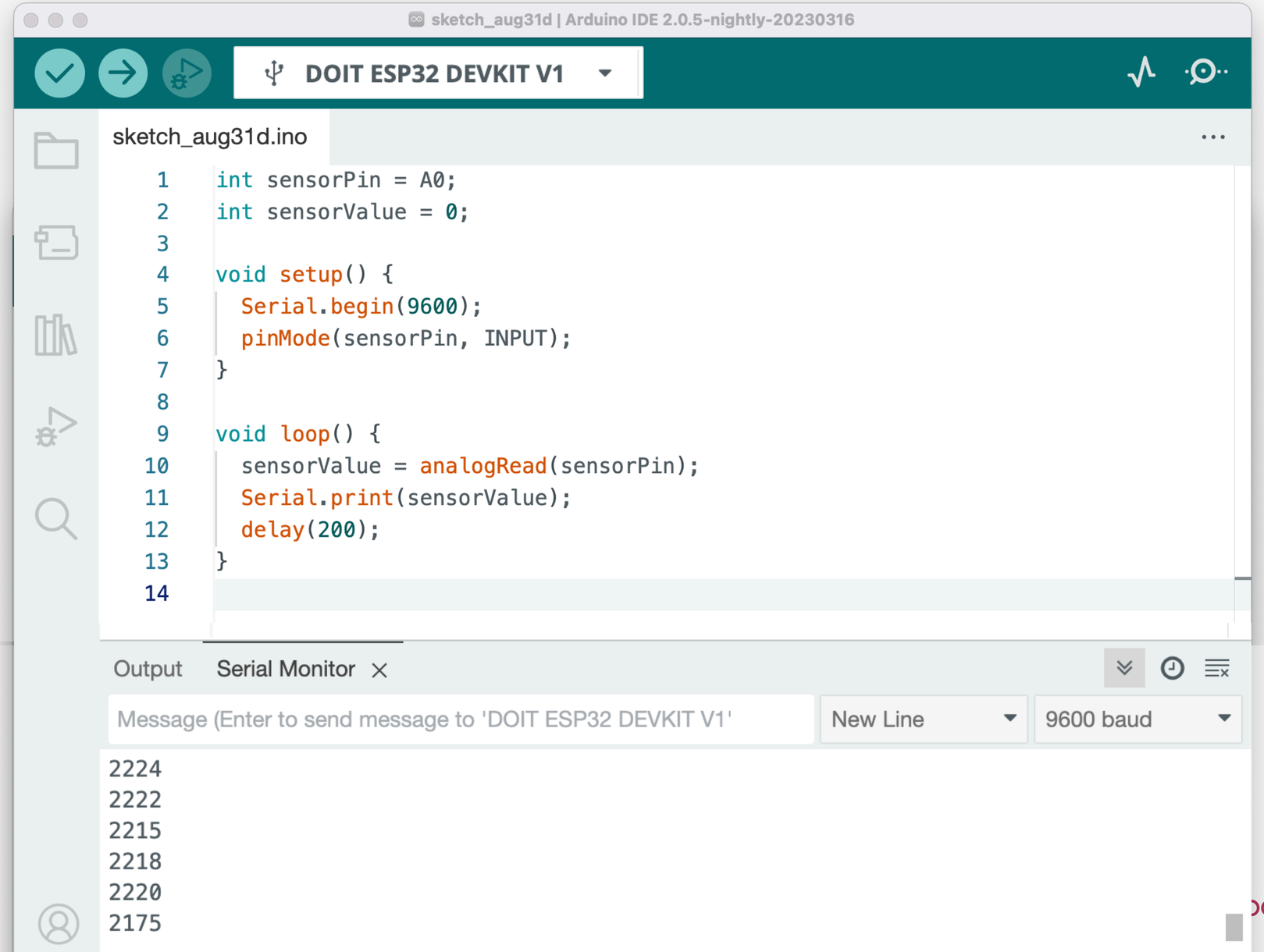
Arduino IDE


sketch_aug31d | Arduino IDE 2.0.5-nightly-20230316
Select Board
Unknown
/dev/cu.Bluetooth-Incoming-Port
Select other board and port...
sketch_aug
1 v
2
3
4 }
5
6 void loop() {
7 // put your main code here, to run repeatedly:
8
9 }
10
run once:
Ln 6, Col 14
No board selected

Arduino IDE


sketch_aug31d | Arduino IDE 2.0.5-nightly-20230316
Select Other Board and Port
Select both a Board and a Port if you want to upload a sketch.
If you only select a Board you will be able to compile, but not to upload your sketch.
BOARDS
PORTS
doi
DOIT ESP32 DEVKIT V1
DOIT ESPduino32
/dev/cu.Bluetooth-Incoming-Port Serial Port
/dev/cu.usbserial-210 Serial Port (USB)
Show all ports
Please pick a board connected to the port you have selected.
CANCEL
OK
Ln 1, Col 1
DOIT ESP32 DEVKIT V1 on /dev/cu.usbserial-210

Exemplo


sketch_aug31d | Arduino IDE 2.0.5-nightly-20230316
DOIT ESP32 DEVKIT V1
sketch_aug31d.ino
1 int sensorPin = A0;
2 int sensorValue = 0;
3
4 void setup() {
5 Serial.begin(9600);
6 pinMode(sensorPin, INPUT);
7 }
8
9 void loop() {
10 sensorValue = analogRead(sensorPin);
11 Serial.print(sensorValue);
12 delay(200);
13 }
14
Output
Serial Monitor
Message (Enter to send message to 'DOIT ESP32 DEVKIT V1'
New Line
9600 baud
2224
2222
2215
2218
2220
2175

Obrigado!

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