

Computer Science AP

IoT - Workshop 2

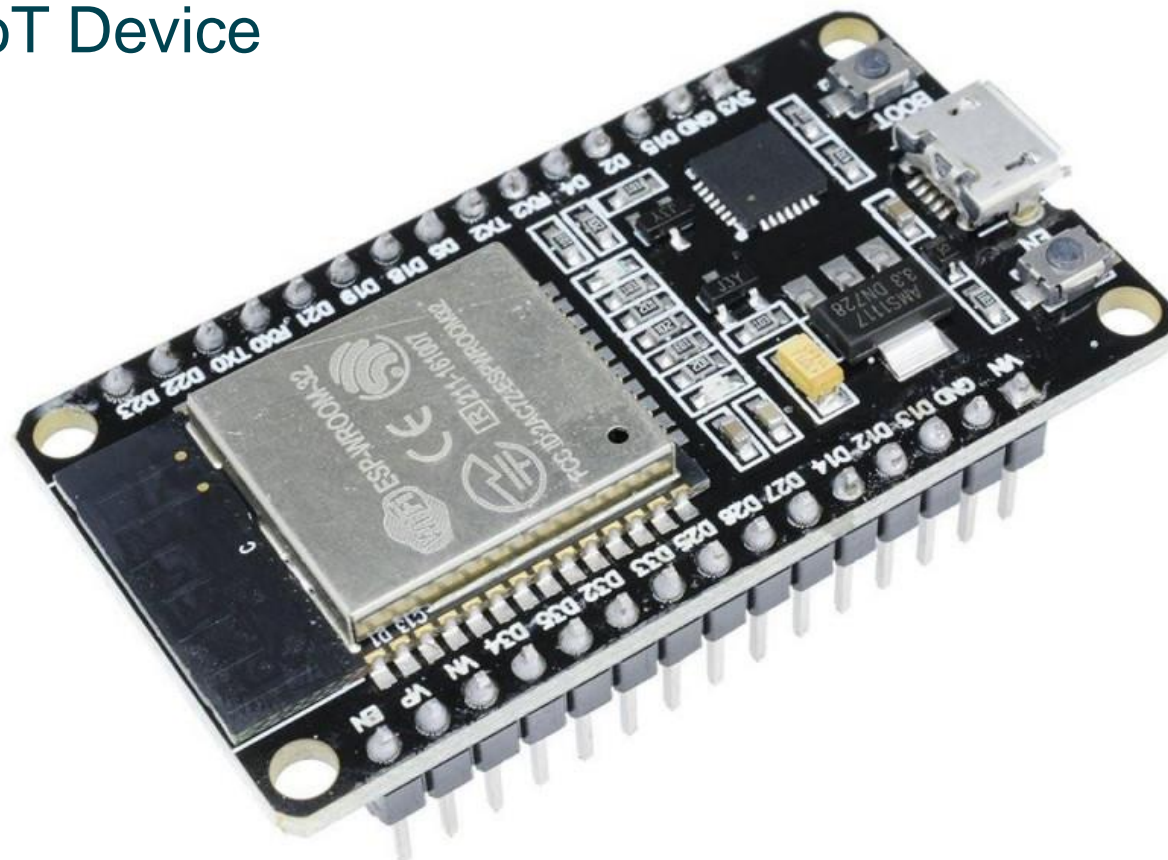
Creating an IoT device

The 3 workshops

Workshop 1: Introduction to IoT and brainstorm

Workshop 2: Creating an IoT Device

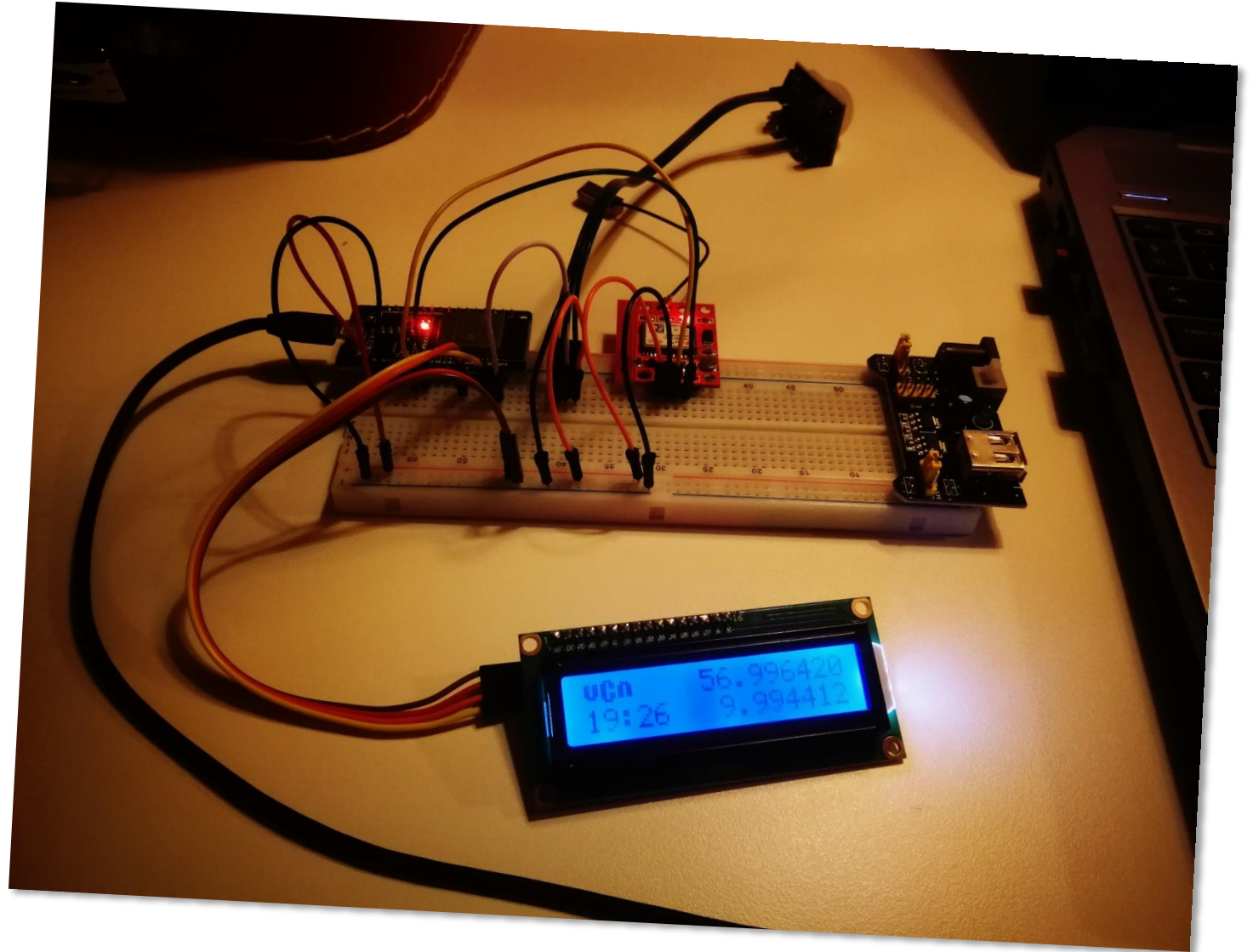
Workshop 3: Creating a interface for our IoT Device



Today

Building our device

- Installing the Arduino IDE
- The ESP 32
- Breadboards
- Adding a Display
- Adding a GPS
- Adding a PIR sensor





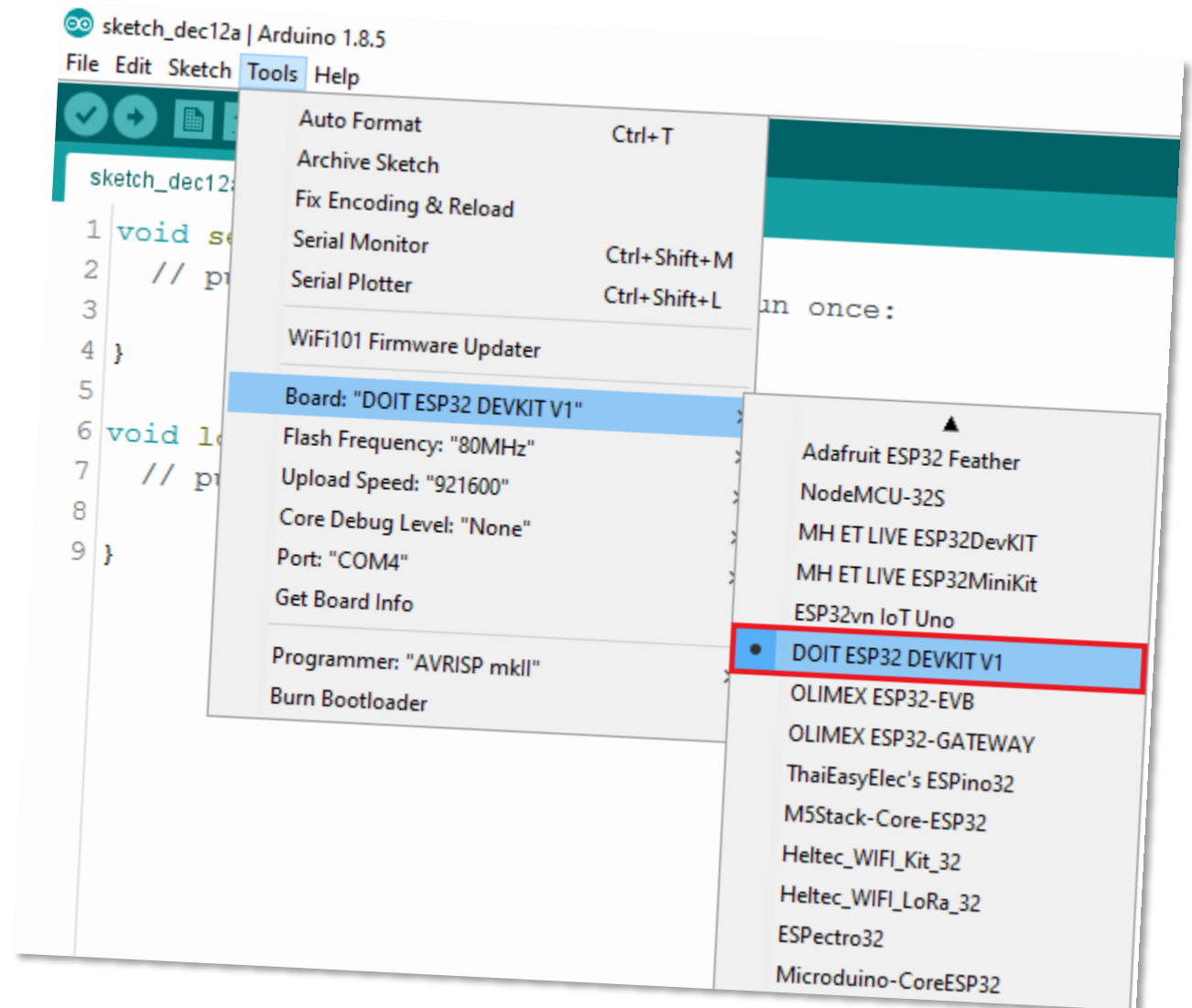
ATTENTION
OBSERVE PRECAUTIONS
FOR HANDLING
ELECTROSTATIC
SENSITIVE
DEVICES



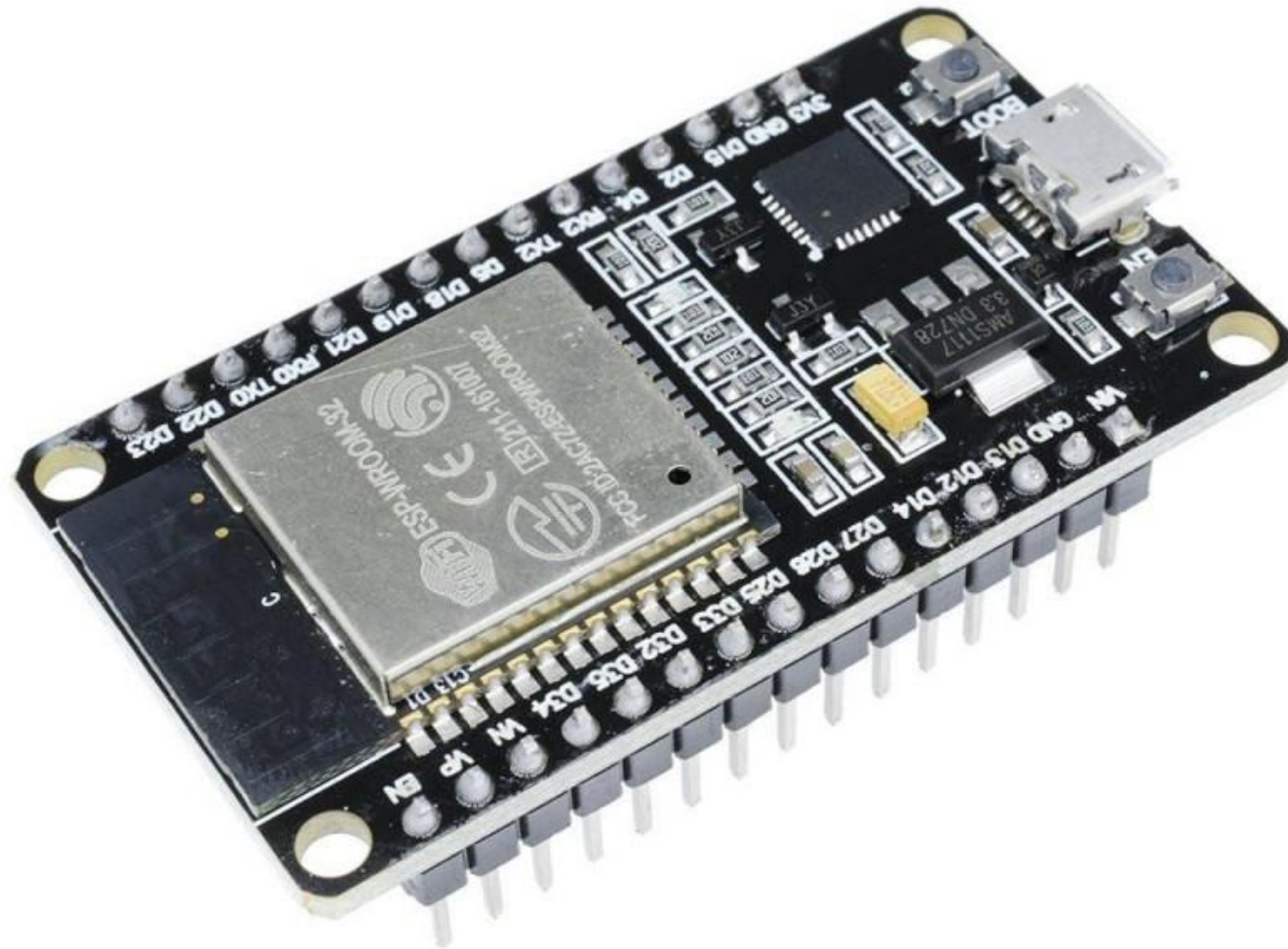
Installing the Arduino IDE

Follow this guide:

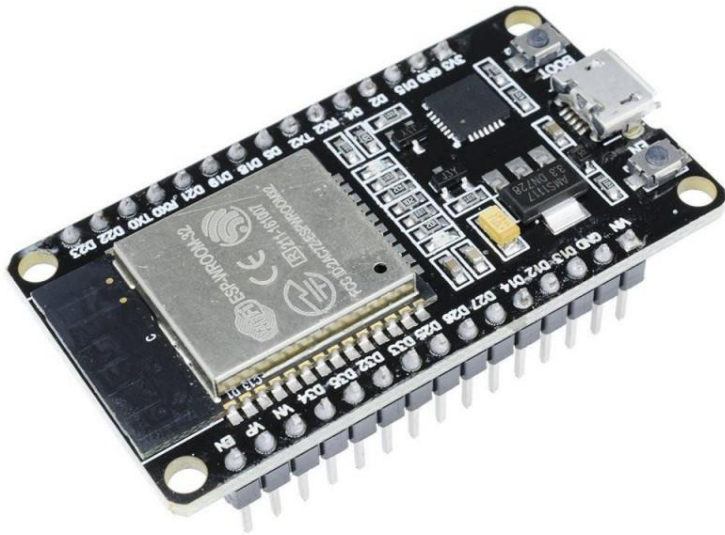
<https://randomnerdtutorials.com/installing-the-esp32-board-in-arduino-ide-windows-instructions/>



The ESP32



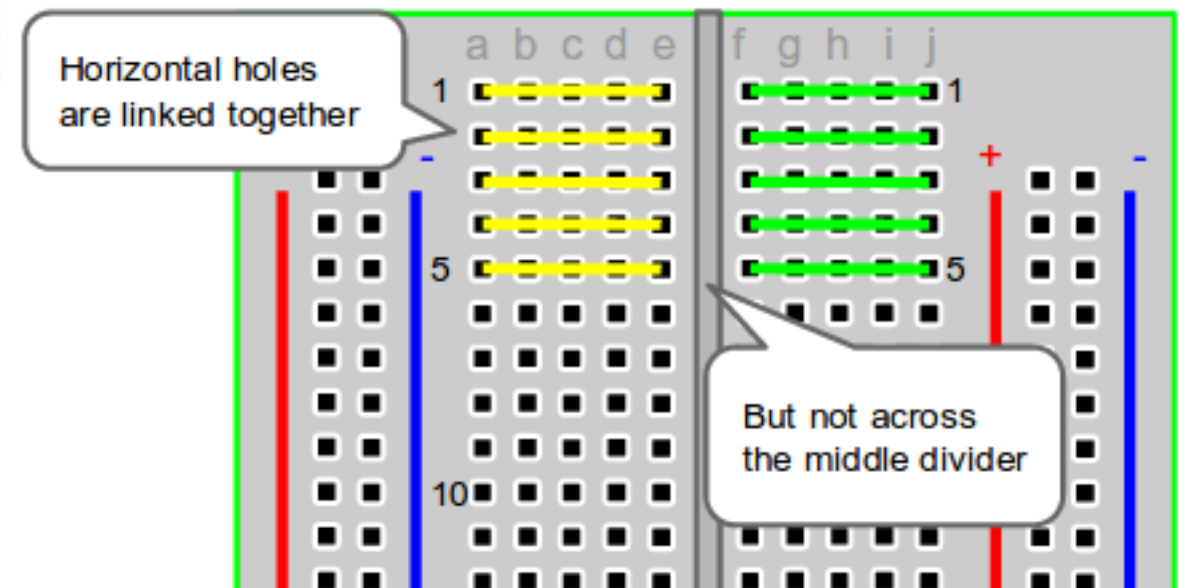
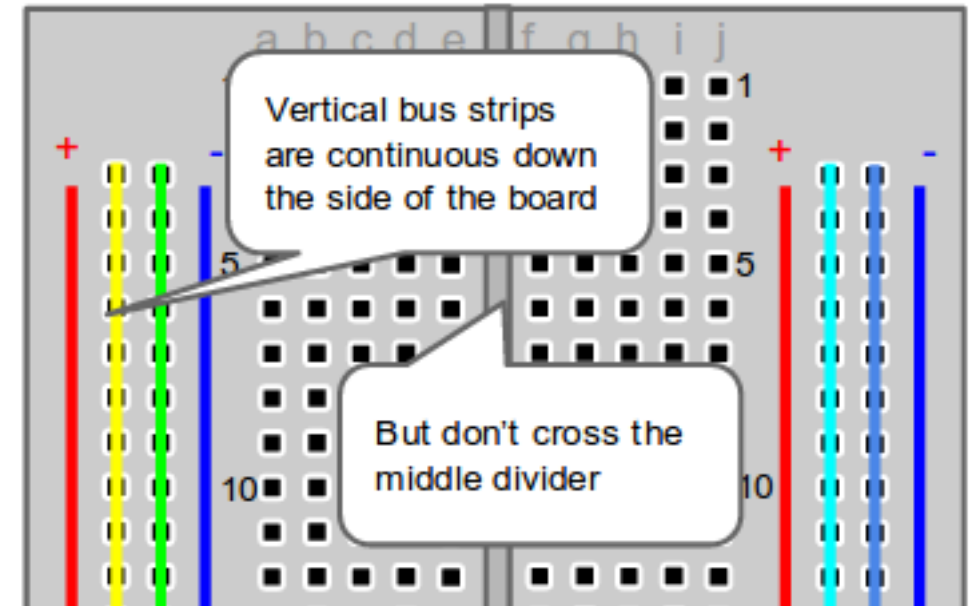
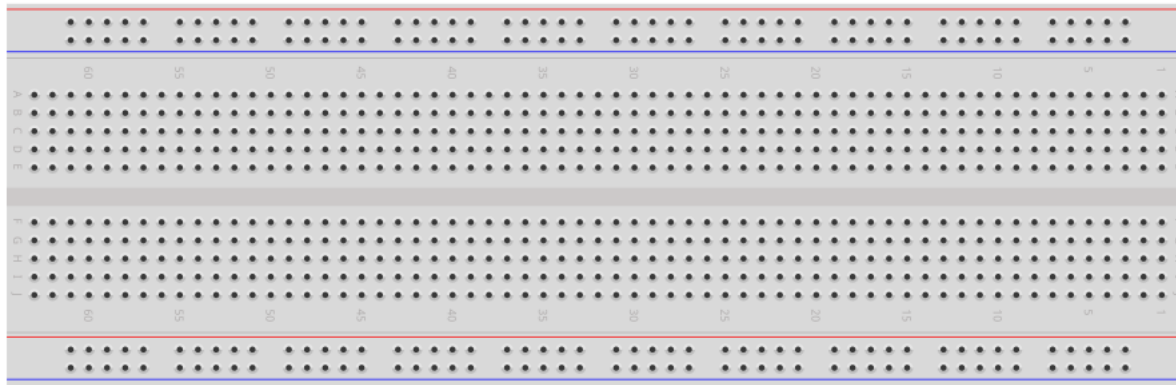
The ESP32



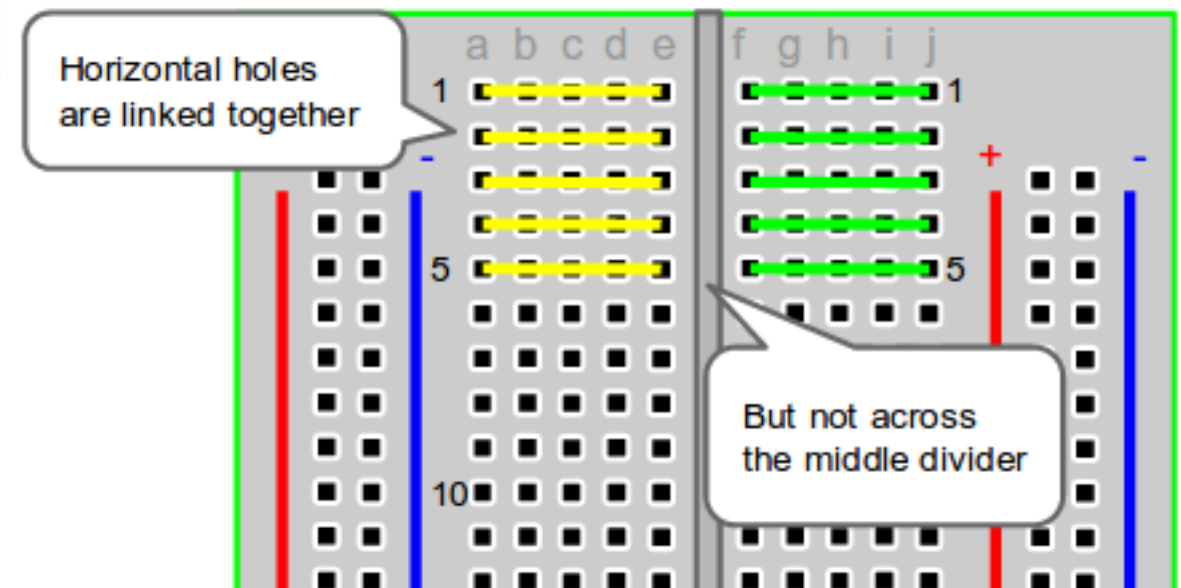
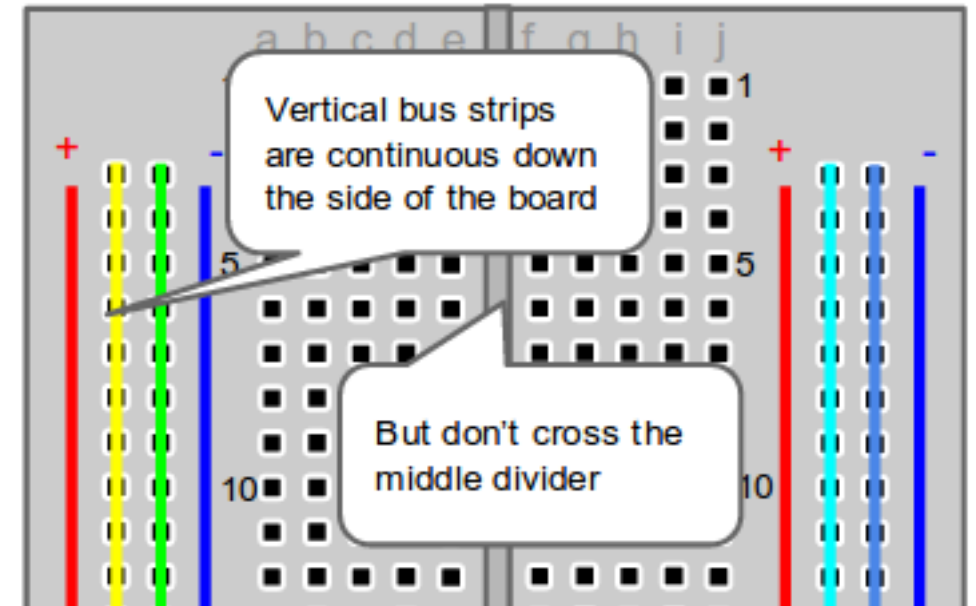
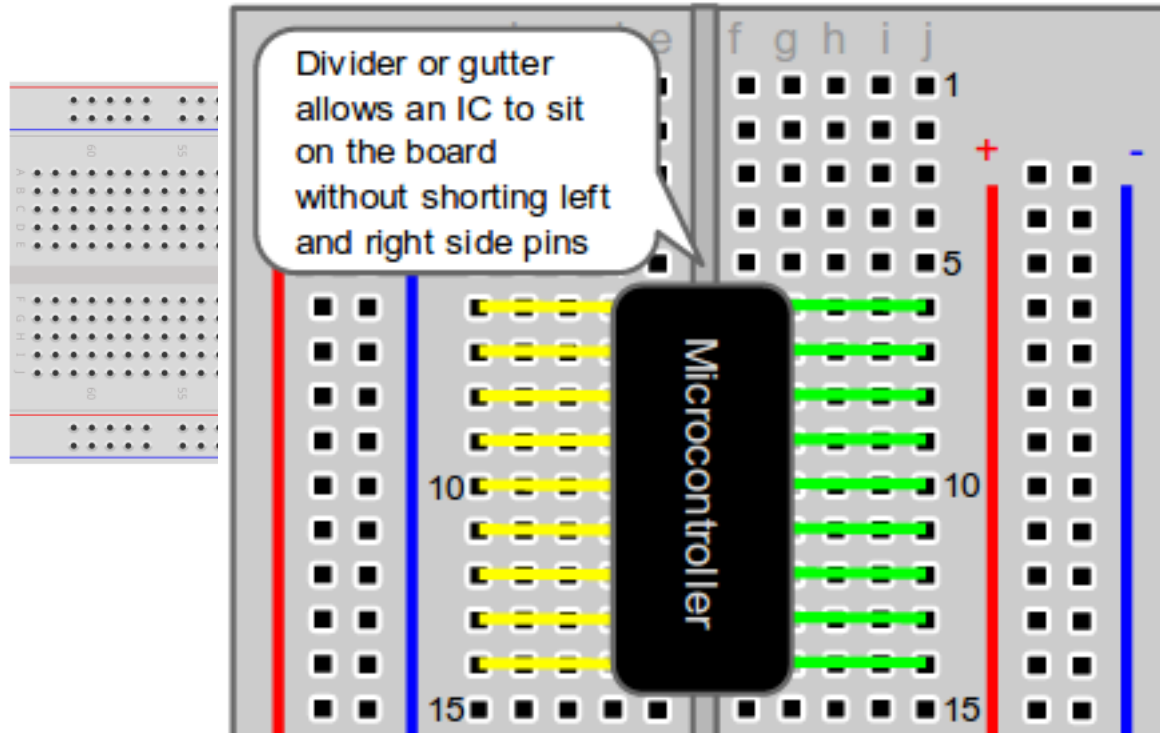
- The ESP32 is dual core, this means it has 2 processors.
- It has Wi-Fi and bluetooth built-in.
- It runs 32 bit programs.
- The clock frequency can go up to 240MHz and it has a 512 kB RAM.
- This particular board has 30 or 36 pins, 15 in each row.
- It also has wide variety of peripherals available, like: capacitive touch, ADCs, DACs, UART, SPI, I2C and much more.
- It comes with built-in hall effect sensor and built-in temperature sensor.

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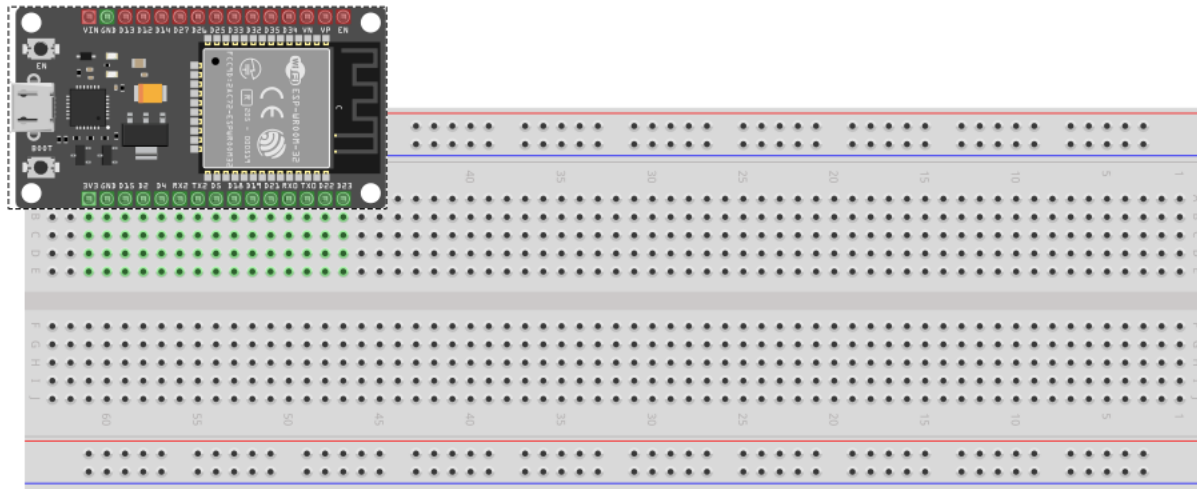
Breadboards



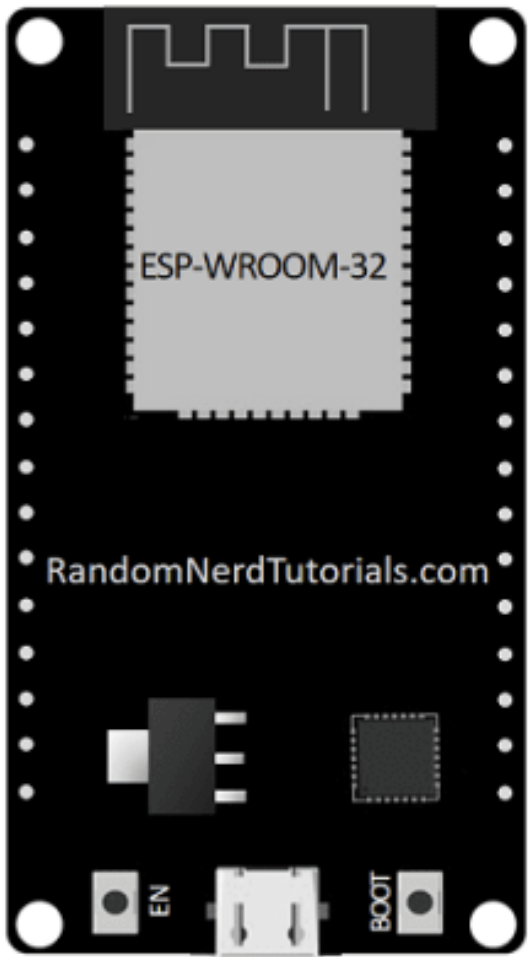
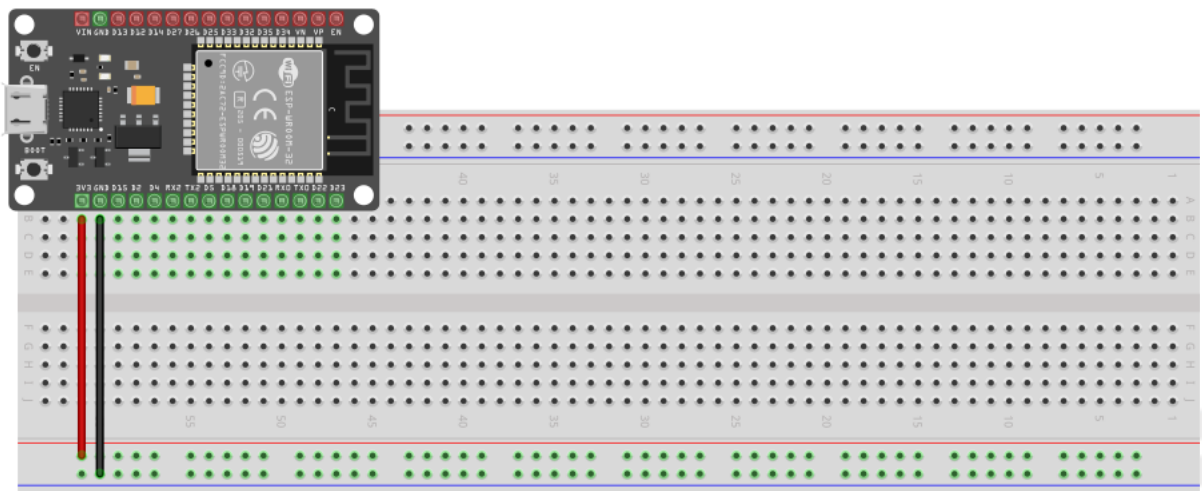
Breadboards



Adding the ESP

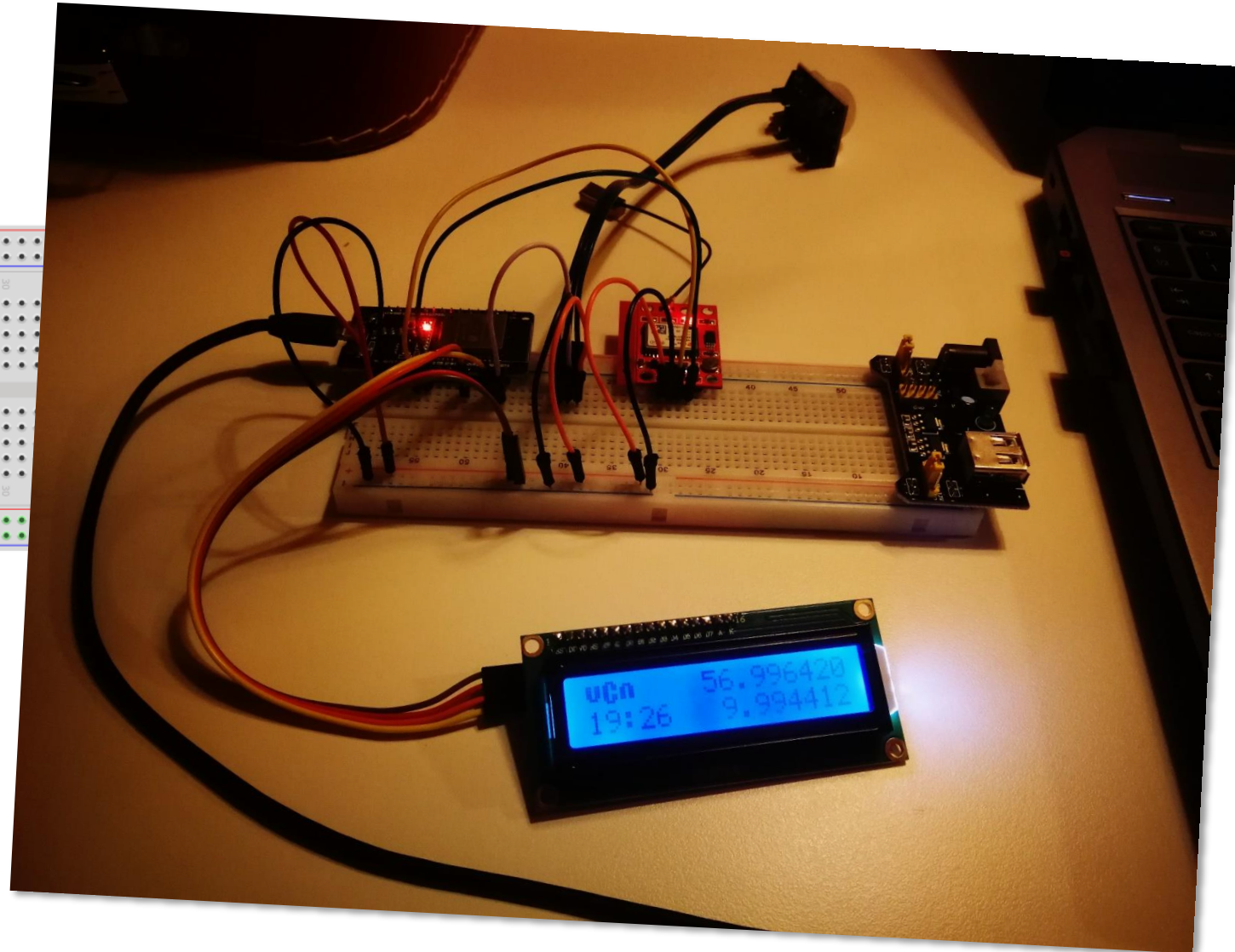
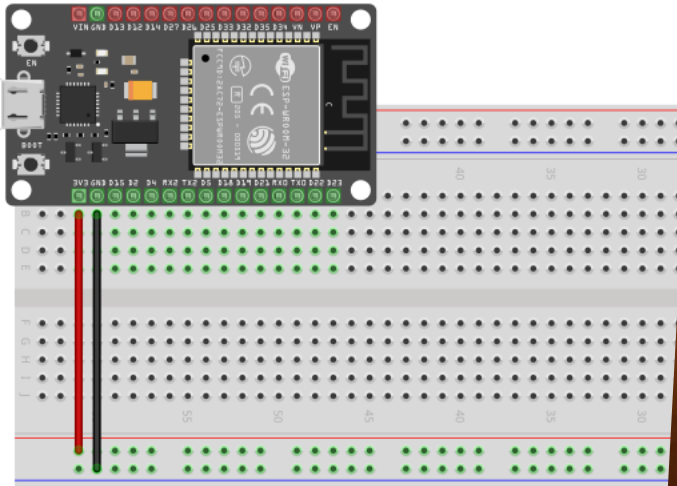


Connecting power to the breadboard

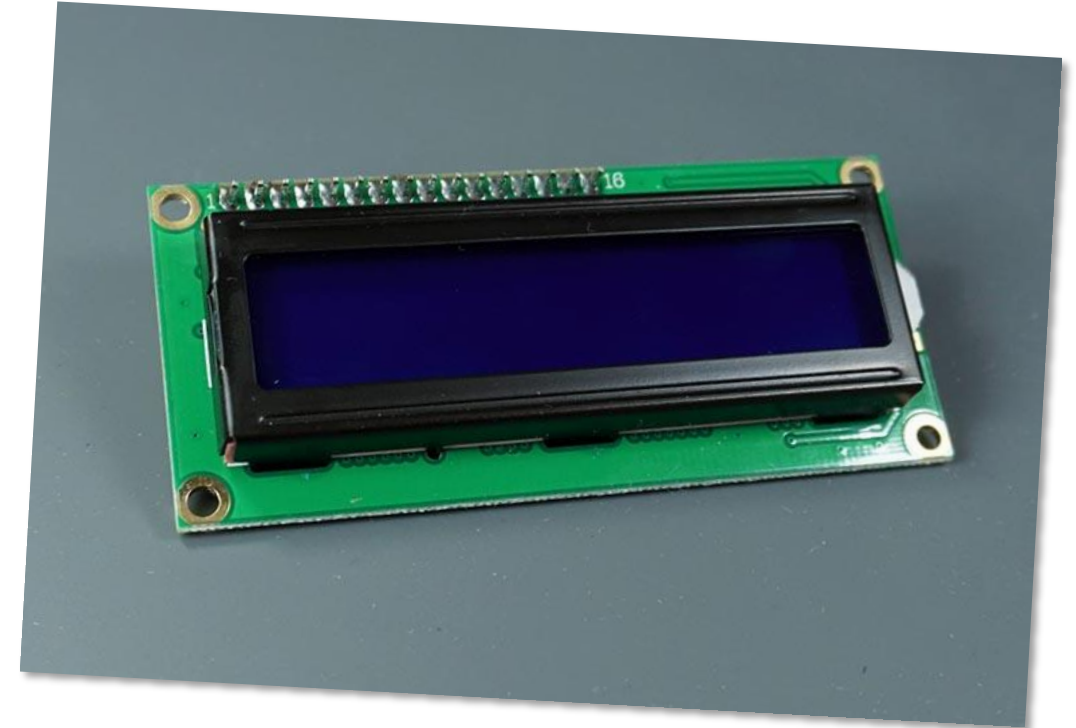
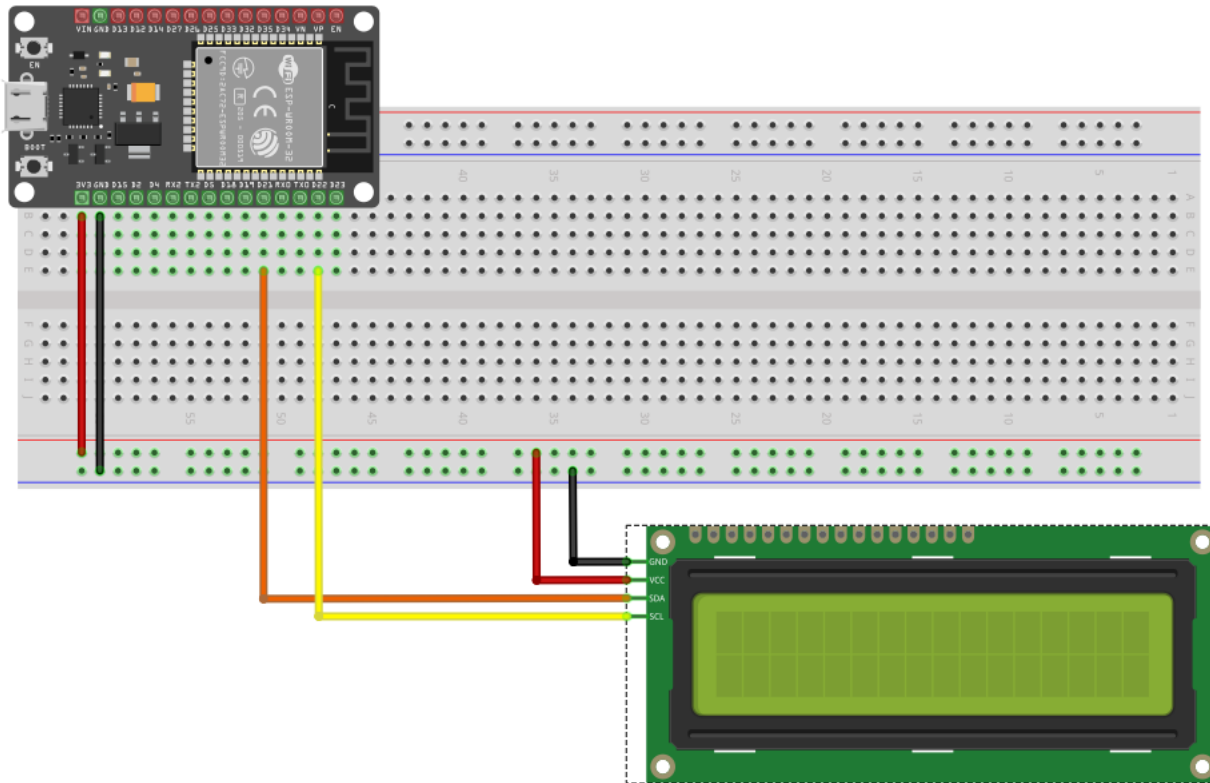


GPIO23	VSPI MOSI			
GPIO22	I2C SCL			
GPIO1	UART 0 TX			
GPIO3	UART 0 RX			
GPIO21	I2C SDA			
GPIO19	VSPI MISO			
GPIO18	VSPI CLK			
GPIO5	VSPI CS0			
GPIO17	UART 2 TX			
GPIO16	UART 2 RX			
GPIO4	ADC2 CH0	TOUCH0	RTC_GPIO10	
GPIO2	ADC2 CH2	TOUCH2	RTC_GPIO12	
GPIO15	ADC2 CH3	TOUCH3	HSPI CS0	RTC_GPIO13
GND				
3V3				

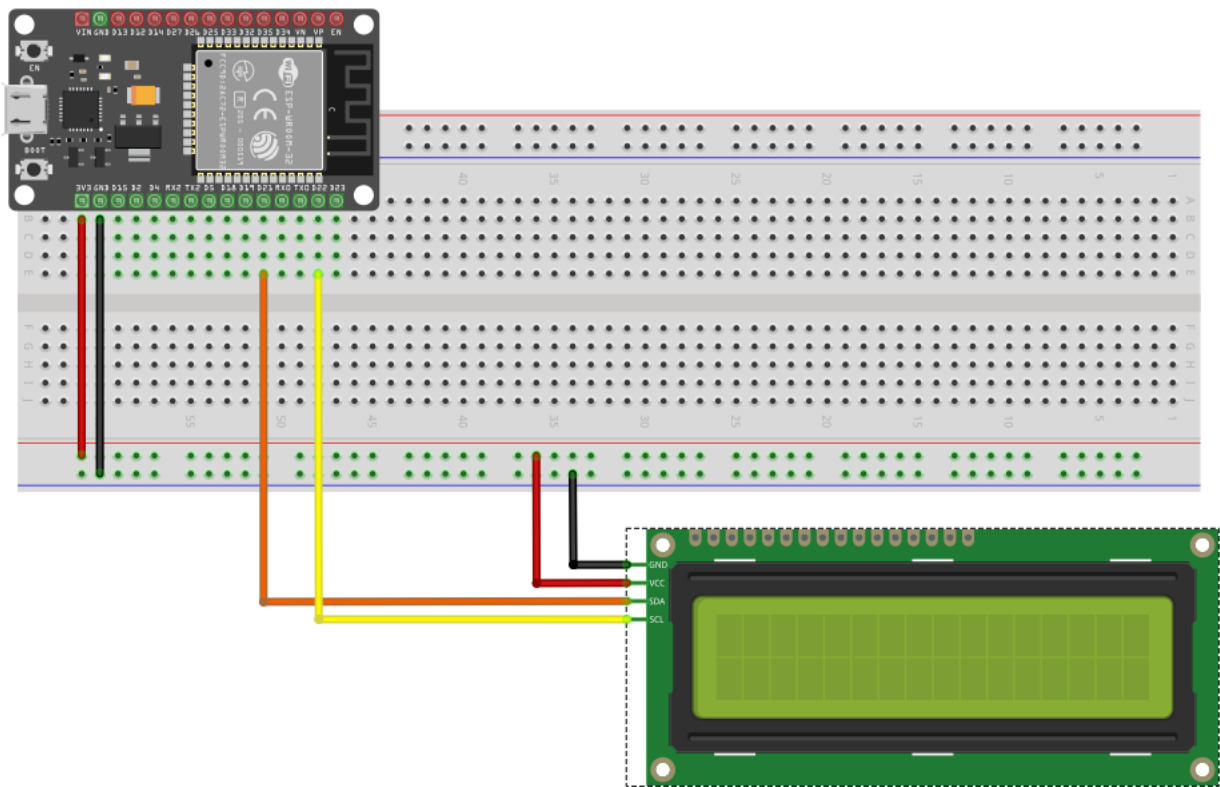
Connecting power to the breadboard



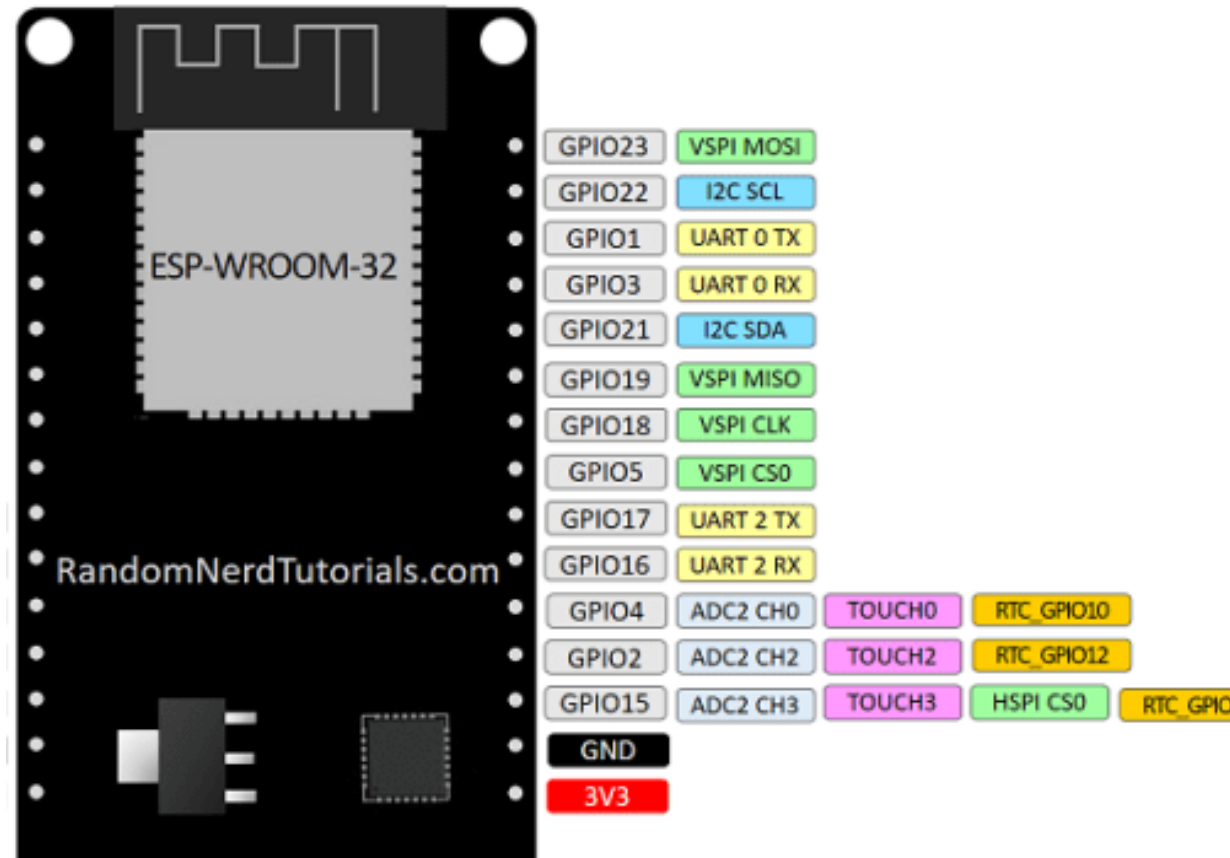
Adding a display



Adding a display



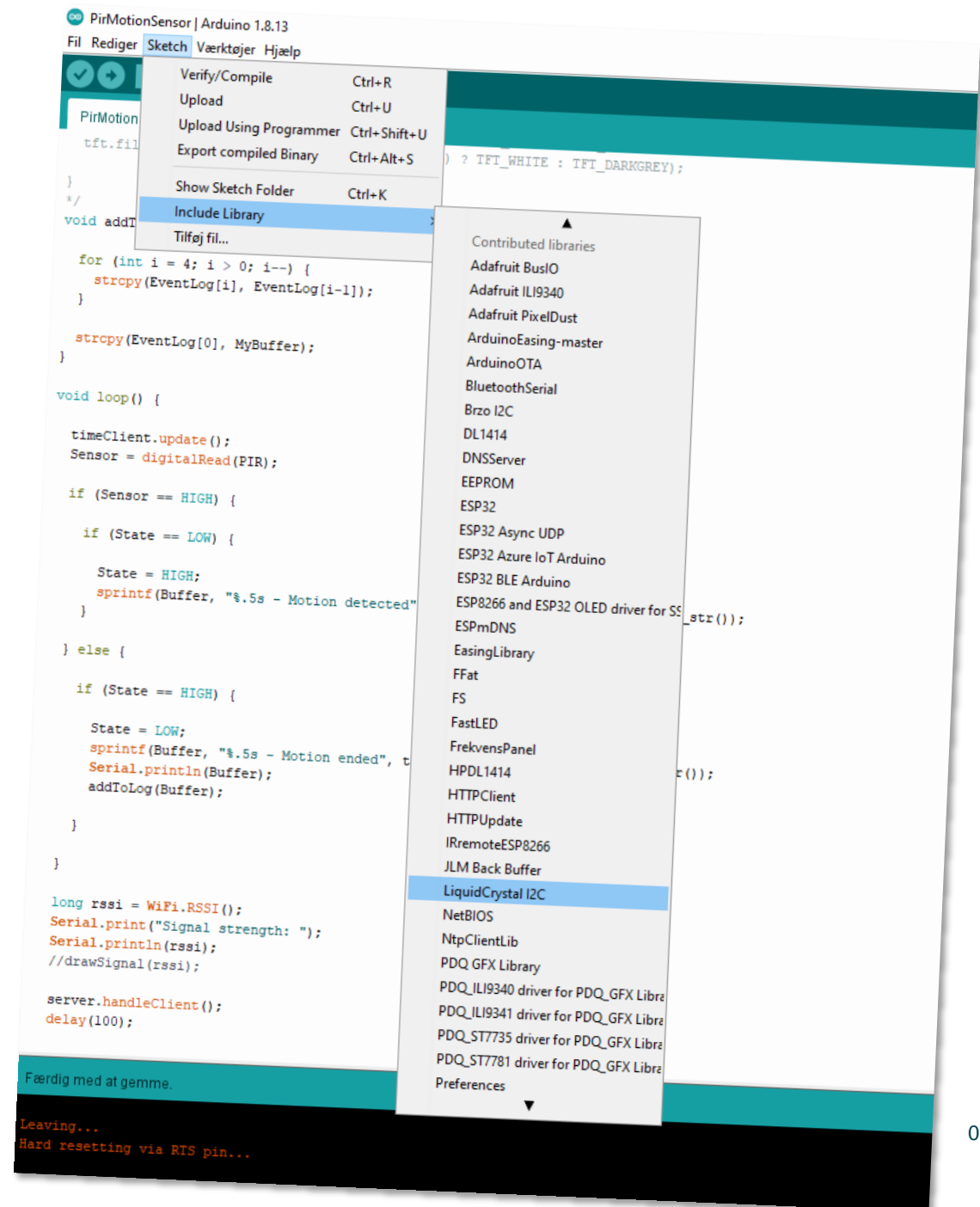
I2C LCD	ESP32
GND	GND
VCC	3v3
SDA	GPIO 21
SCL	GPIO 22



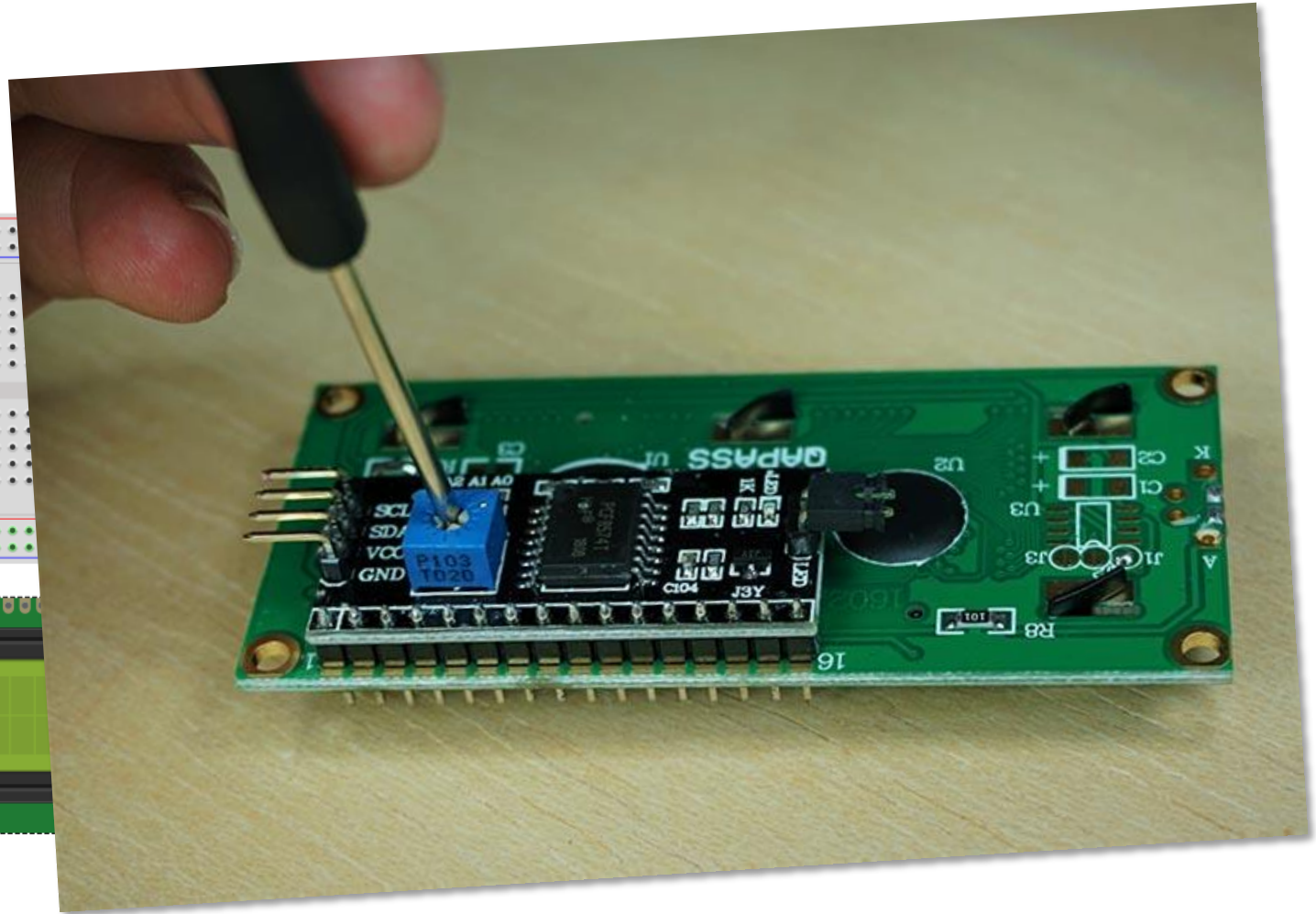
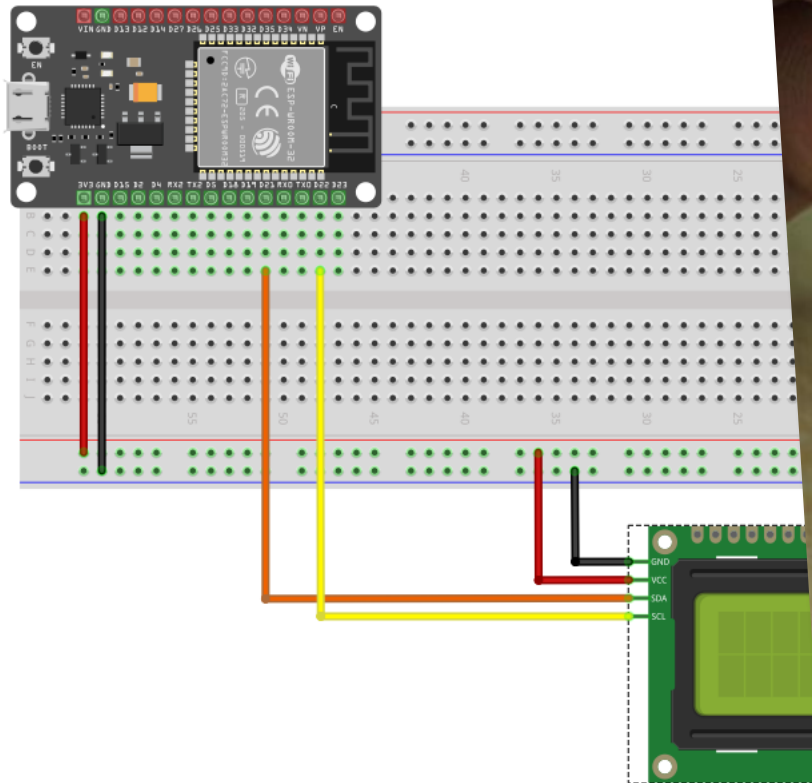
Installing a library

2 ways

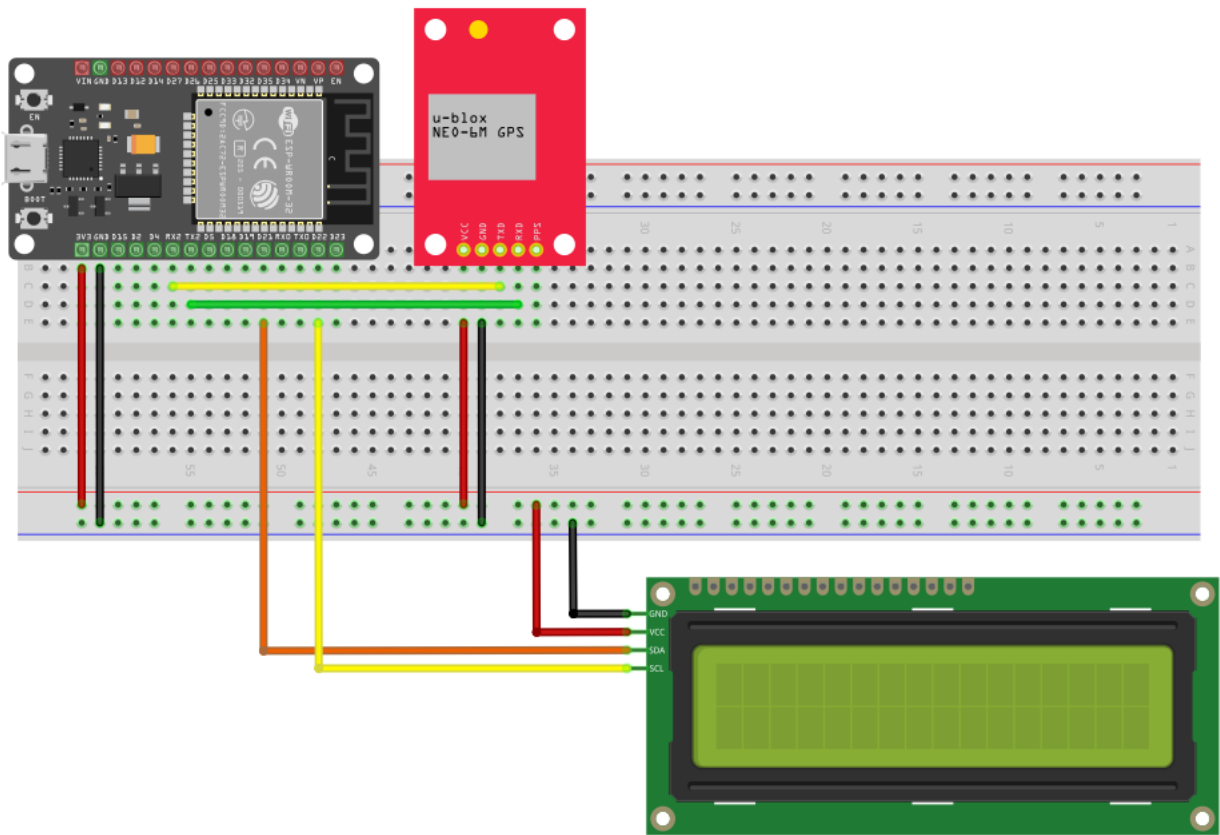
- Official libraries
- Custom libraries



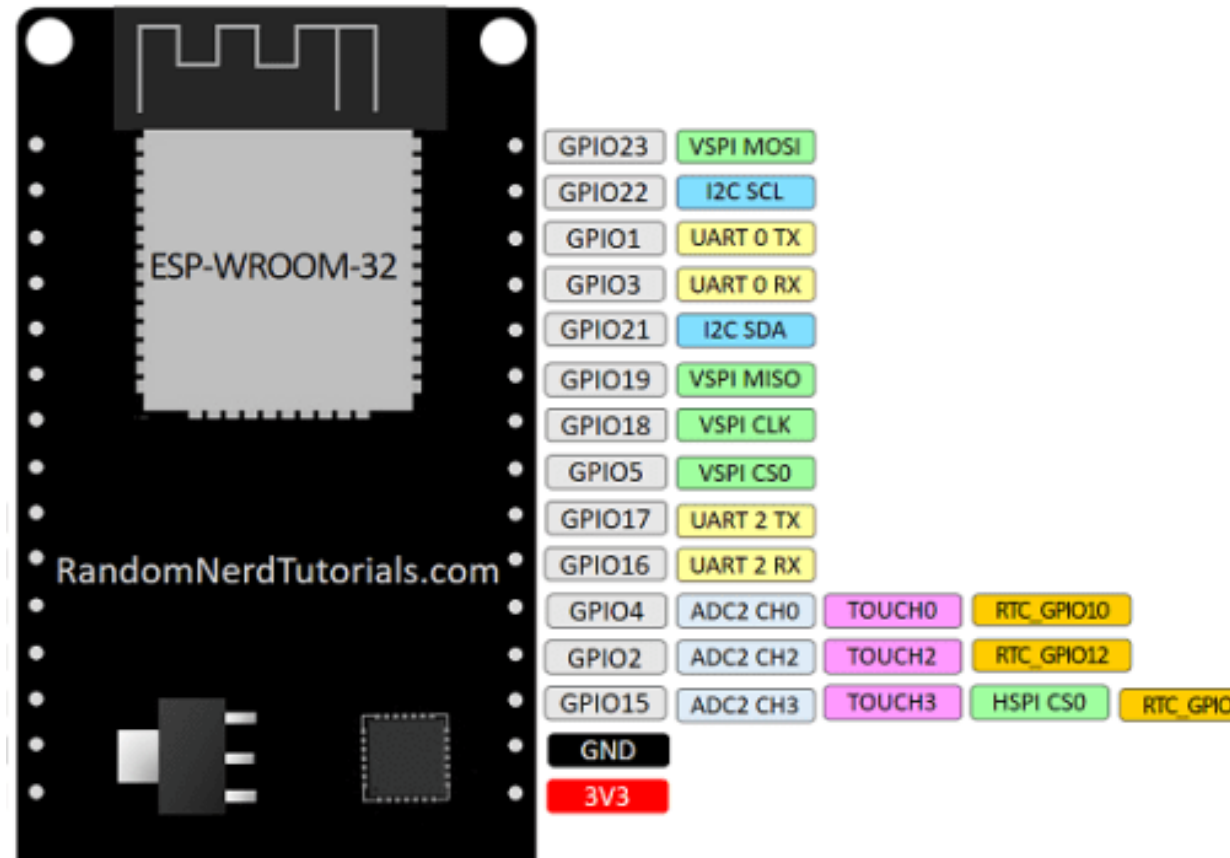
Adjusting contrast



Adding GPS

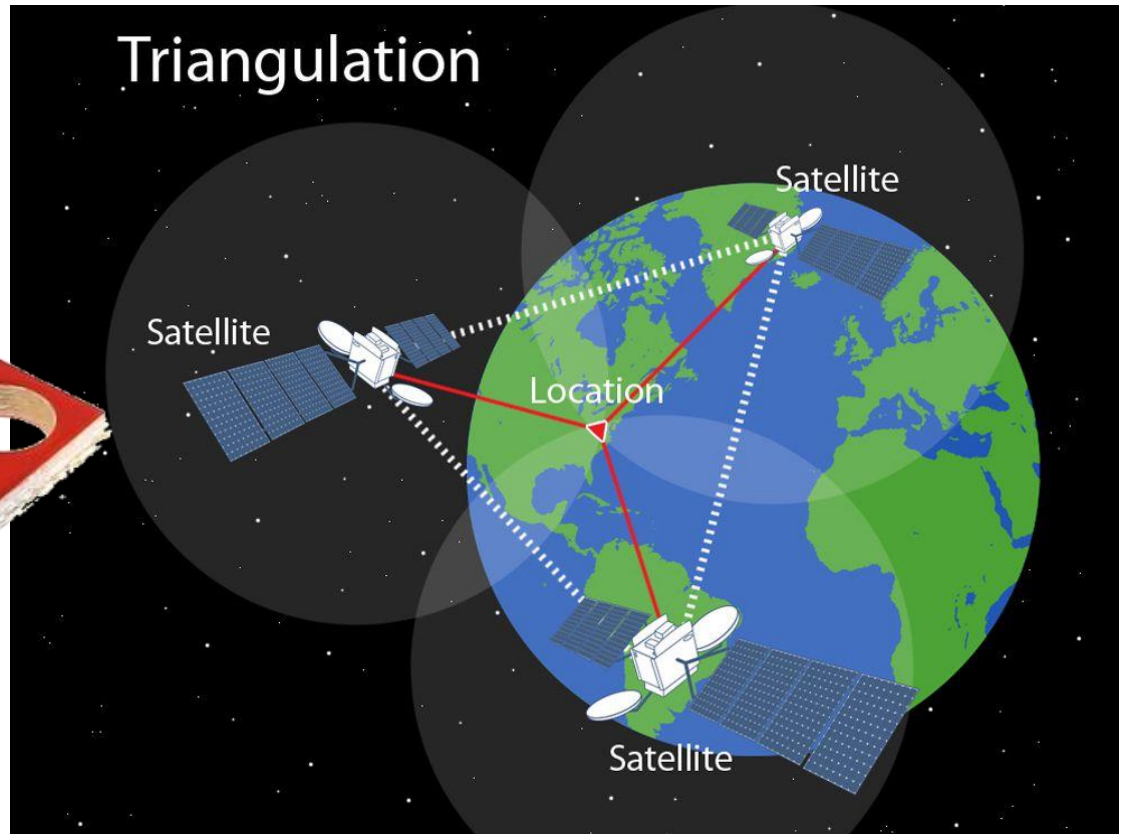
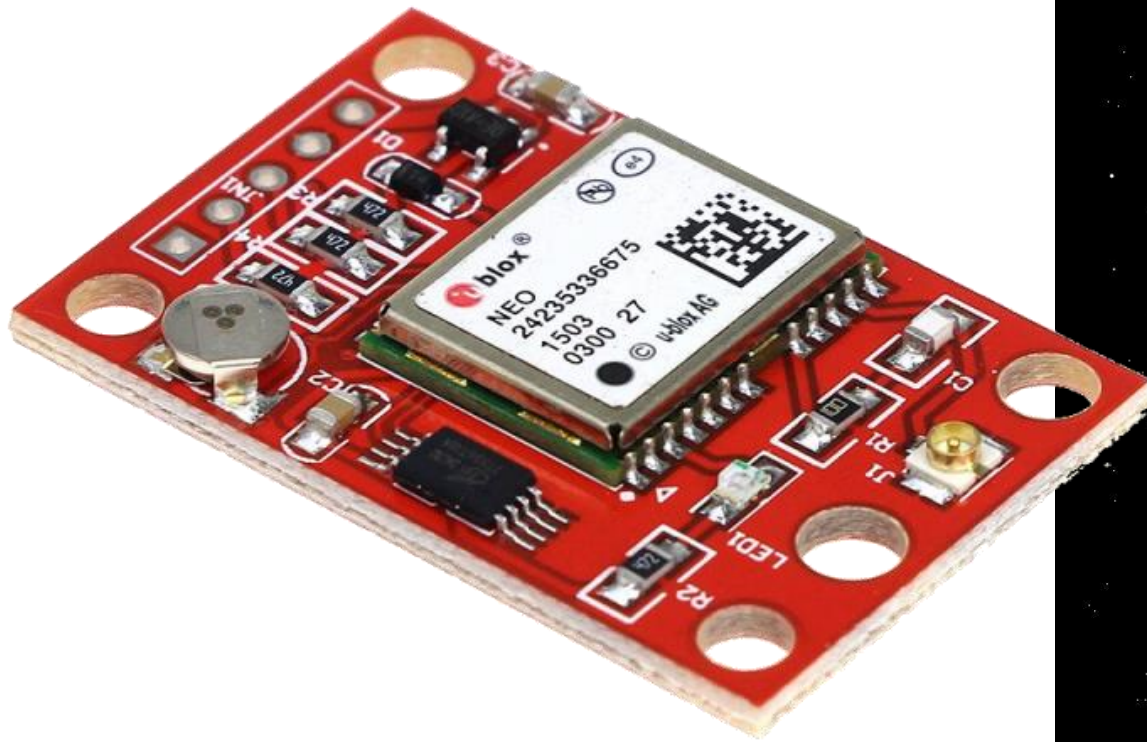


GPS	ESP32
GND	GND
VCC	3v3
TXD	RX2
RXD	TX2

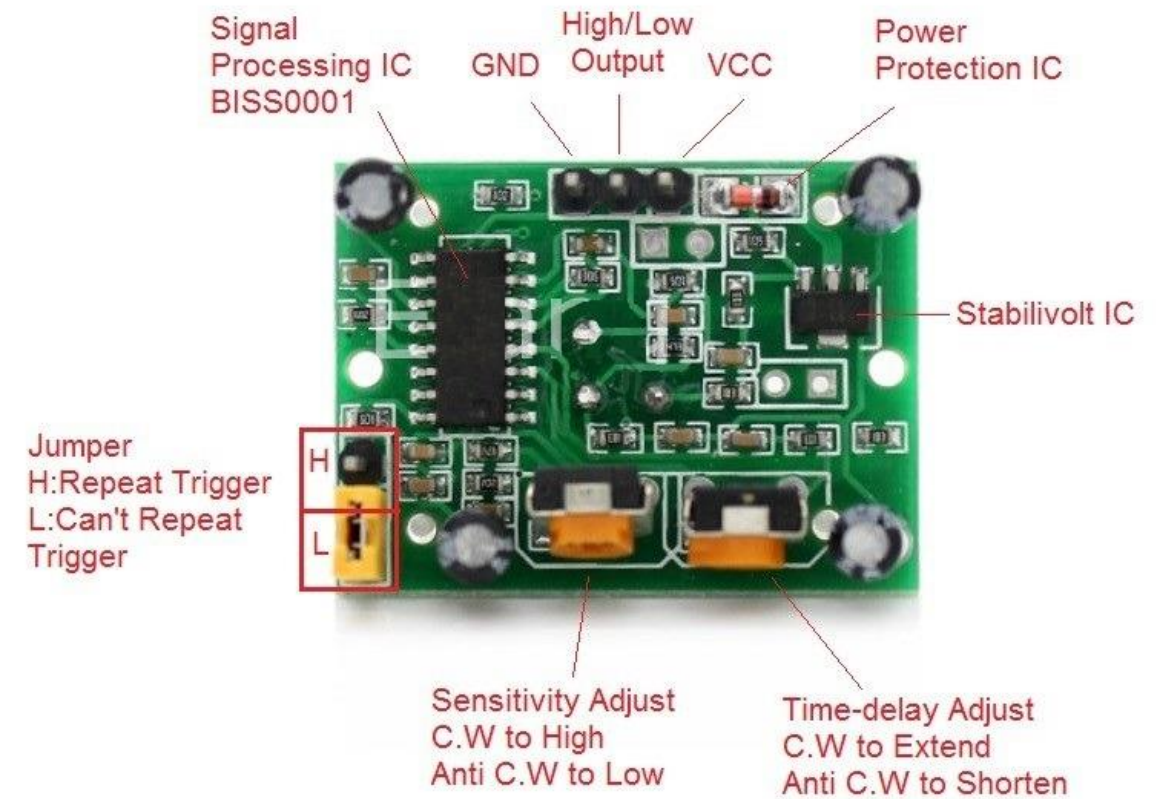
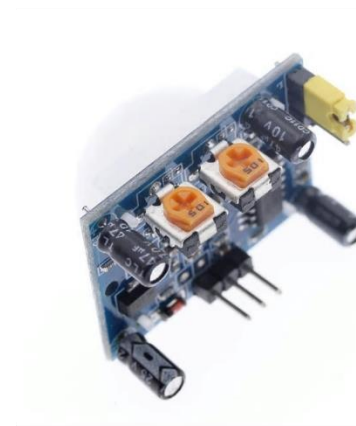
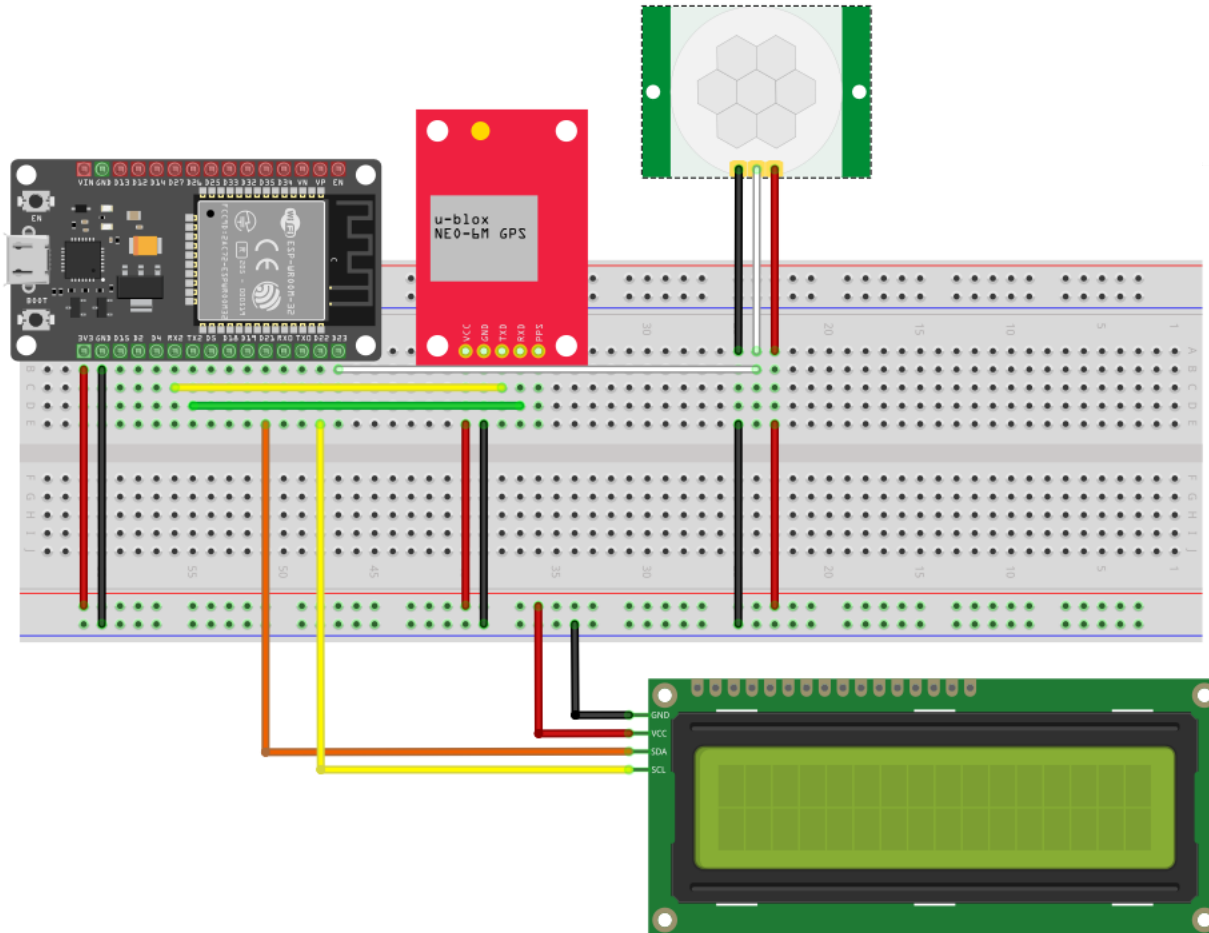


NEO 6m GPS module

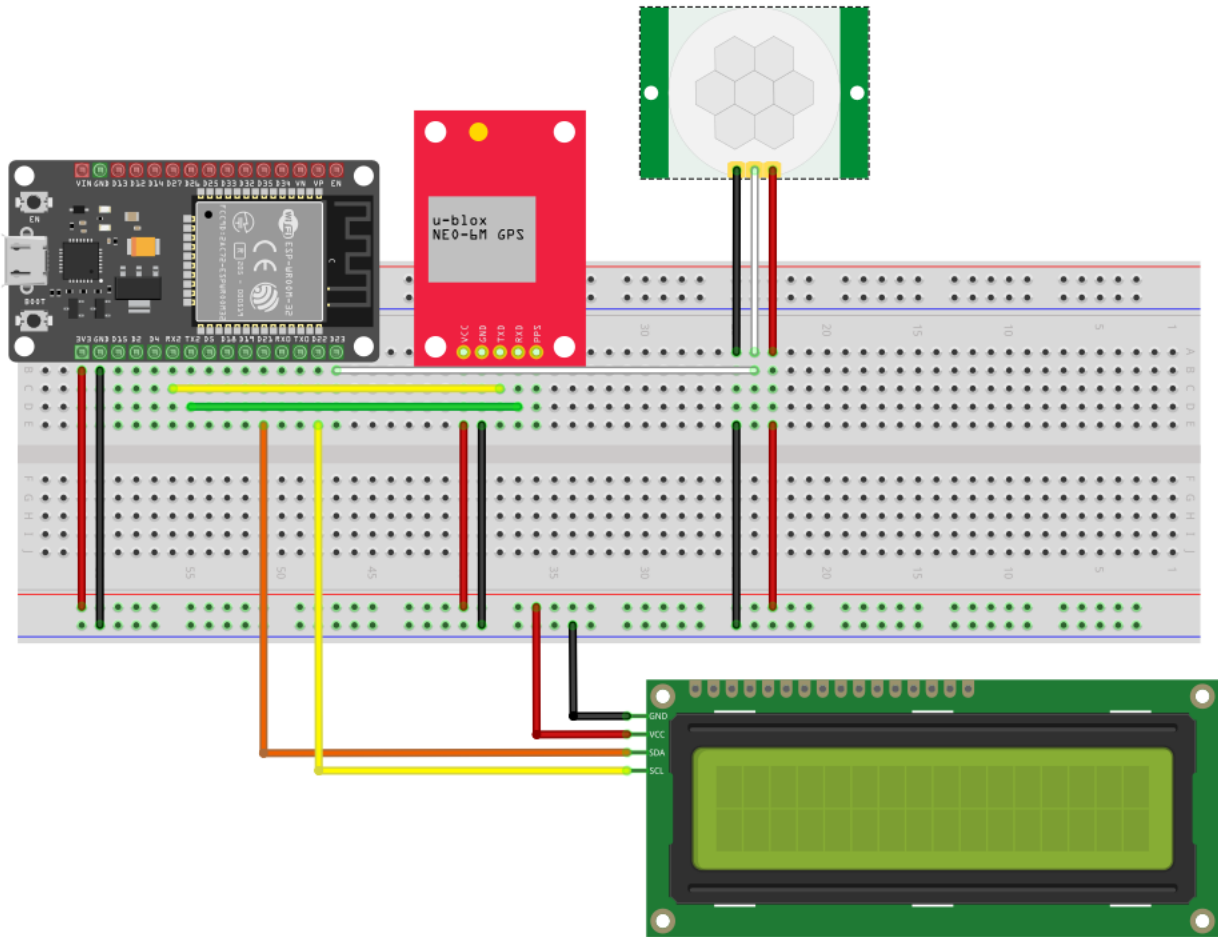
- <https://randomnerdtutorials.com/guide-to-neo-6m-gps-module-with-arduino/>



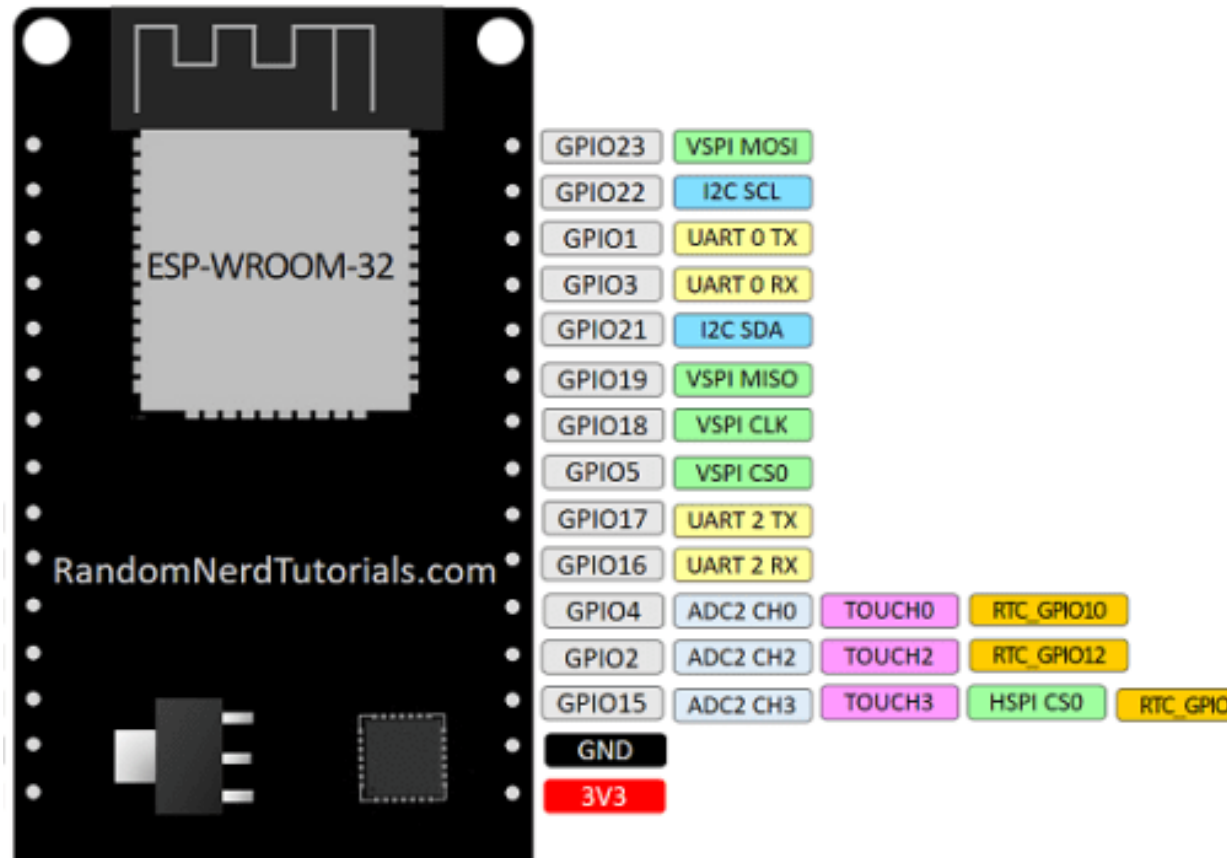
Adding PIR



Adding PIR



PIR	ESP32
GND	GND
VCC	3v3
OUT	GPIO23



Sources

Intro to ESP32

- <https://randomnerdtutorials.com/getting-started-with-esp32/>
- <https://randomnerdtutorials.com/installing-the-esp32-board-in-arduino-ide-windows-instructions/>

Adding a display

- <https://randomnerdtutorials.com/esp32-esp8266-i2c-lcd-arduino-ide/>

Adding a GPS

- <https://randomnerdtutorials.com/guide-to-neo-6m-gps-module-with-arduino/>