



# Pemrograman Sensor

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# Obyektif

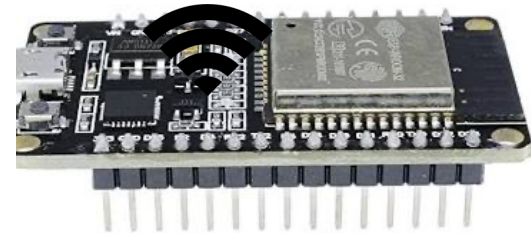
- Menggunakan Arduino-IDE untuk berinteraksi dengan Sensor
- Navigasi Arduino-IDE untuk mempermudah pemrograman

# Pemrograman Sensor & Aktuator

- Pemrograman tidak dapat dilakukan langsung diatas Microcontroller
- Harus menggunakan Laptop atau Desktop yang dilengkapi dengan **Integrated Development Enviroment (IDE)** Software, dalam hal ini digunakan Arduino-IDE
- Arduino-IDE dari Komputer akan dihubungkan dengan Microcontroller (dalam hal ini dipilih ESP32 sebagai contoh)
- Konfigurasi dan Test Koneksi Arduino-IDE dengan ESP32



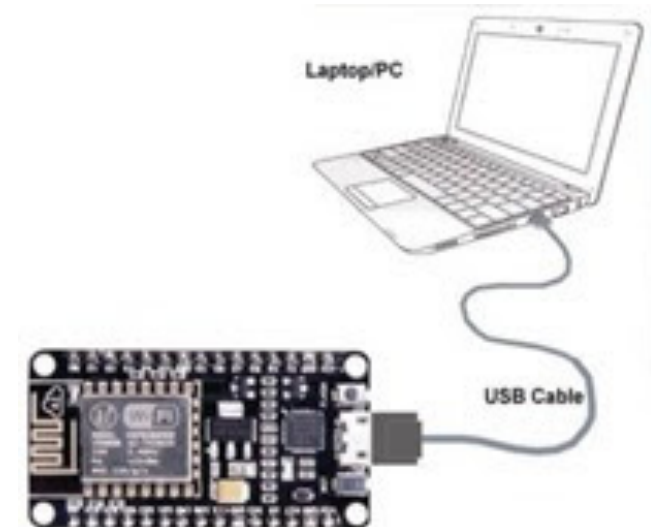
**ESP32**



# Koneksi Laptop dan ESP32

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- Hubungkan kabel USB-Type A dari Laptop dengan USB Type B Micro di ESP32 (seperti cable charger handphone)



# Instalasi Software Arduino-IDE

## Downloads



### Arduino IDE 2.2.1

The new major release of the Arduino IDE is faster and even more powerful! In addition to a more modern editor and a more responsive interface it features autocompletion, code navigation, and even a live debugger.

For more details, please refer to the [Arduino IDE 2.0 documentation](#).

Nightly builds with the latest bugfixes are available through the section below.

#### SOURCE CODE

The Arduino IDE 2.0 is open source and its source code is hosted on [GitHub](#).

#### DOWNLOAD OPTIONS

**Windows** Win 10 and newer, 64 bits

**Windows** MSI installer

**Windows** ZIP file

**Linux** AppImage 64 bits (X86-64)

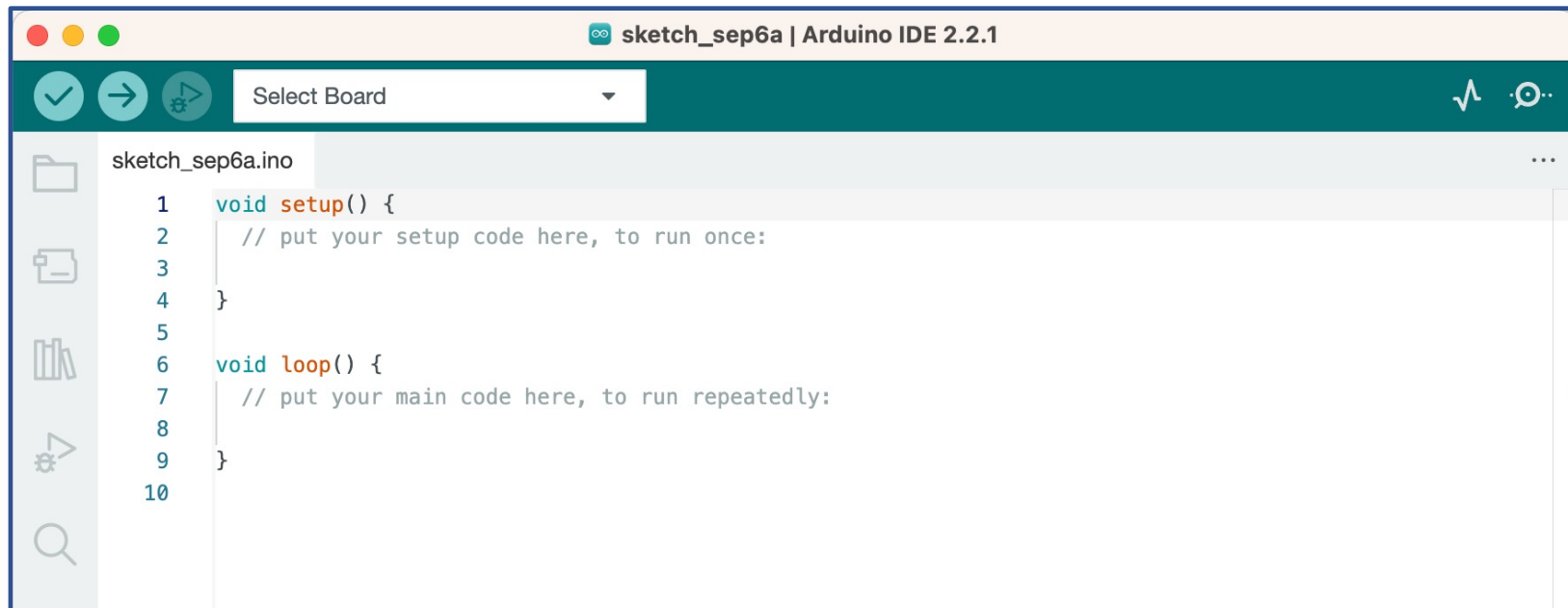
**Linux** ZIP file 64 bits (X86-64)

**macOS** Intel, 10.14: "Mojave" or newer, 64 bits

**macOS** Apple Silicon, 11: "Big Sur" or newer, 64 bits

[Release Notes](#)

# Pasca Instalasi



**setup()** : Program inisialisasi yang dijalankan hanya satu kali, saat eksekusi dimulai

**loop()**: Fungsi yang dijalankan terus menerus (forever), merupakan inti dari program Microcontroller

# Konfigurasi Arduino-IDE

- Pilih Konfigurasi dengan tipe dari ESP32 yang digunakan (pada contoh disini menggunakan LOLIN D32)
- Instalasi Espressif ESP32 Driver dari Board Manager
- Konfigurasi serial output dan lain-lain



Isi Additional Boards Manager URLs dengan Chip yang dipilih:

Preferences ×

Settings Network

Sketchbook location:  
 BROWSE

☐ Show files inside Sketches

Editor font size:

Interface scale: ☒ Automatic  %

Theme:  ▼

Language:  ▼ (Reload required)

Show verbose output during ☐ compile ☐ upload


Compiler warnings  ▼

☐ Verify code after upload

☒ Auto save

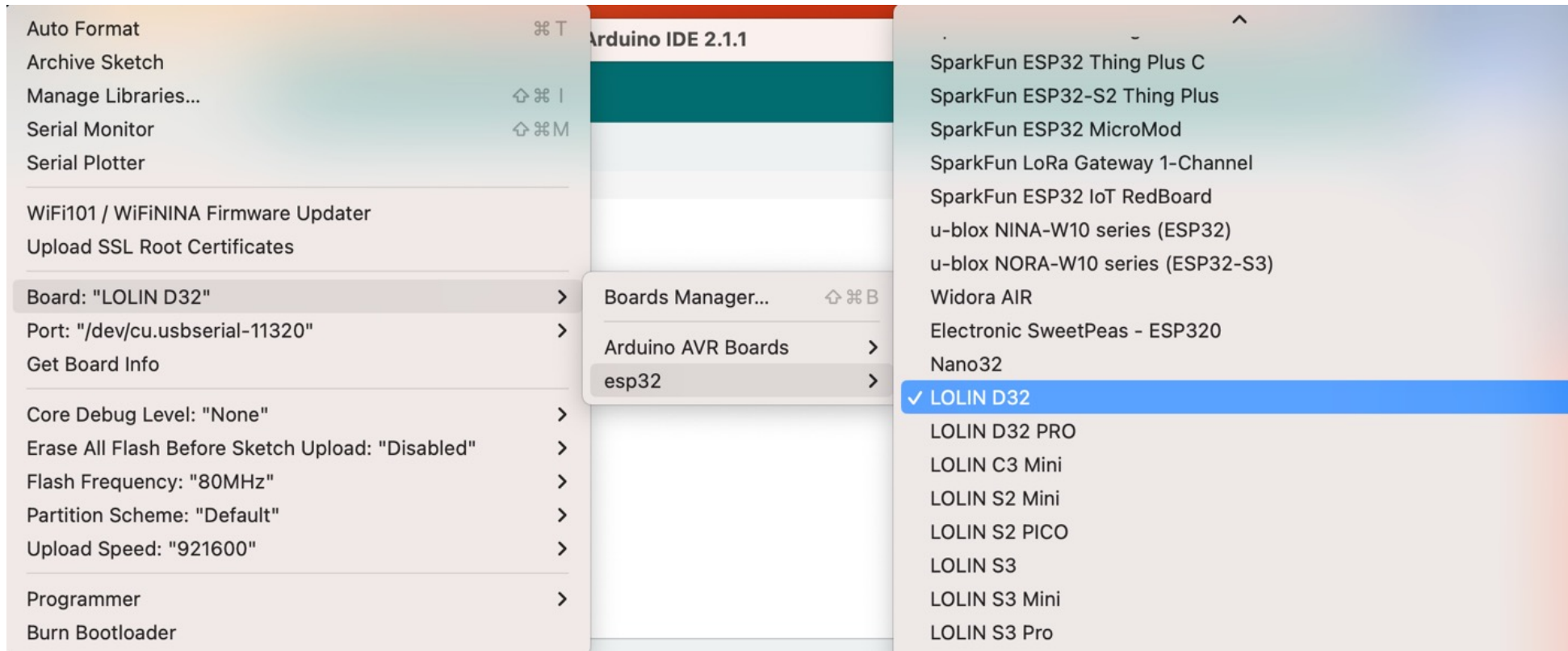
☐ Editor Quick Suggestions

Additional boards manager URLs:



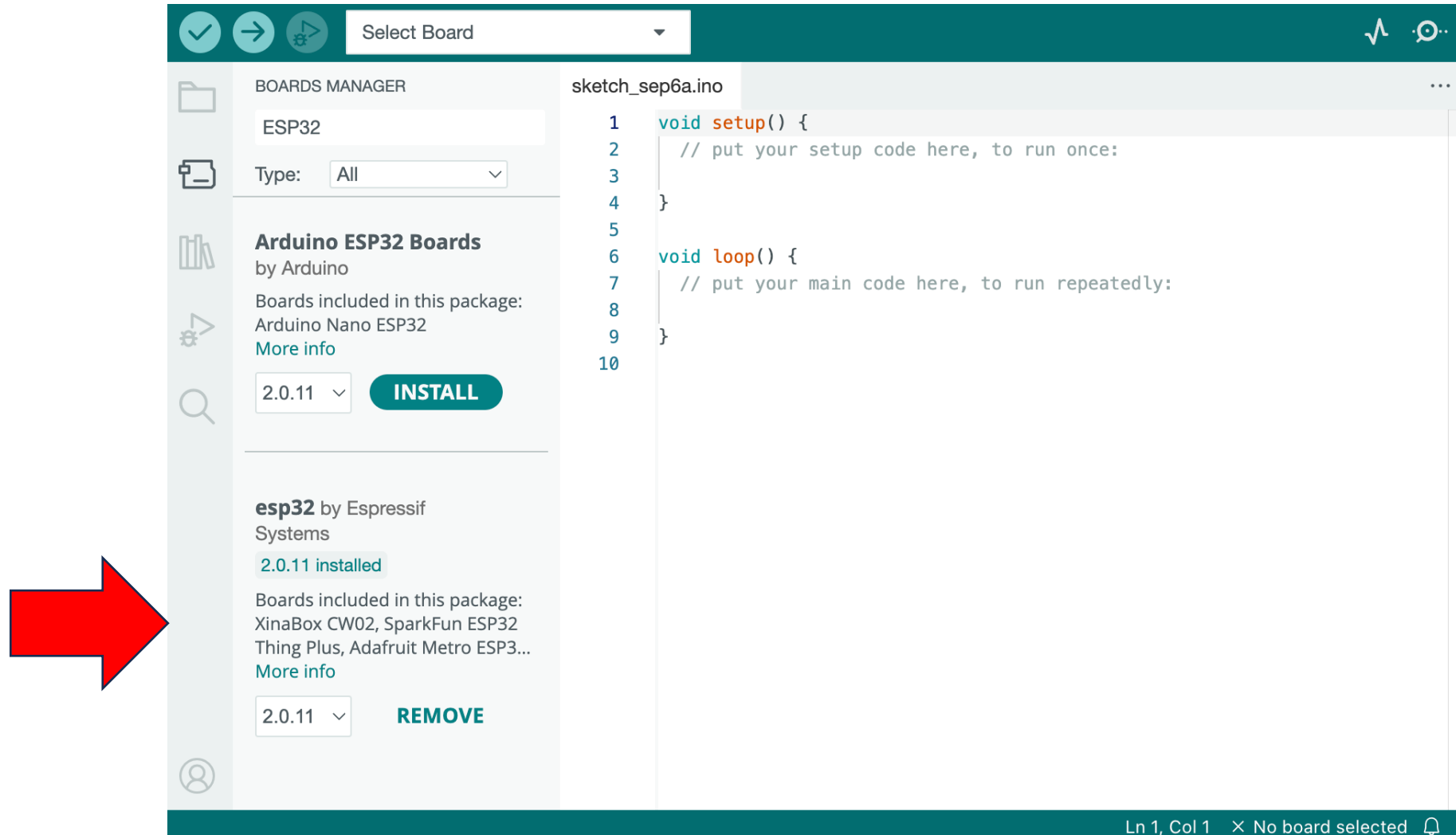
# Instalasi Board ESP32

Dari menu "Tools" > "Board" > "Boards Manager...".



Pilih "esp32" oleh Espressif Systems dan pilih "Install".

# Pastikan Driver MicroController ESP32 terpasang



The screenshot shows the Arduino IDE interface. At the top, there's a 'Select Board' dropdown menu. Below it, the 'BOARDS MANAGER' tab is active. On the left sidebar, there are icons for file explorer, boards manager, and search. The main area displays two board packages:

- Arduino ESP32 Boards** by Arduino:
  - Boards included in this package: Arduino Nano ESP32
  - Version: 2.0.11
  - Button: **INSTALL**
- esp32** by Espressif Systems:
  - Status: 2.0.11 installed
  - Boards included in this package: XinaBox CW02, SparkFun ESP32 Thing Plus, Adafruit Metro ESP3...
  - Version: 2.0.11
  - Button: **REMOVE**

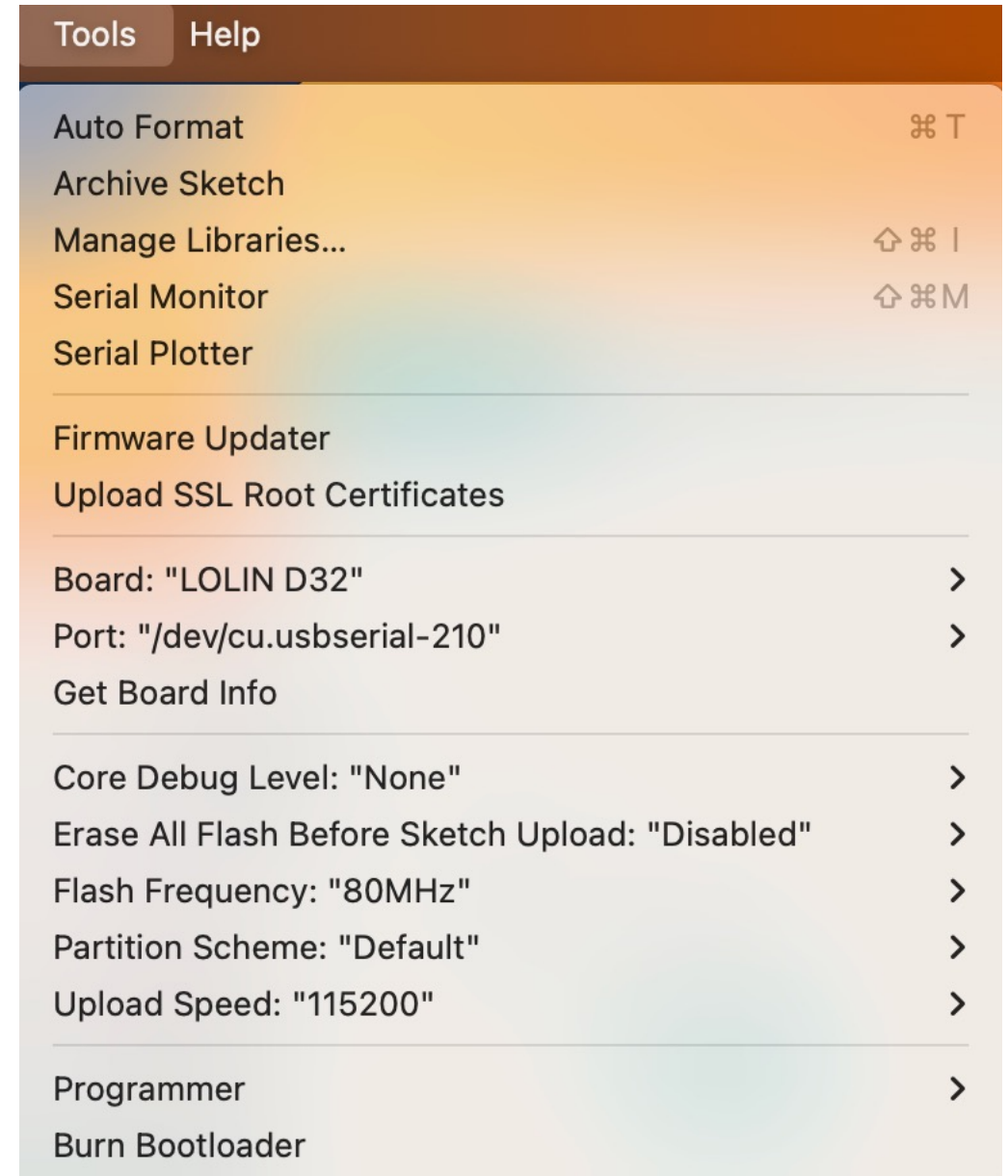
A large red arrow points to the 'esp32 by Espressif Systems' entry. The code editor on the right shows a sketch named 'sketch\_sep6a.ino' with the following code:

```
1 void setup() {  
2   // put your setup code here, to run once:  
3  
4 }  
5  
6 void loop() {  
7   // put your main code here, to run repeatedly:  
8  
9 }  
10
```

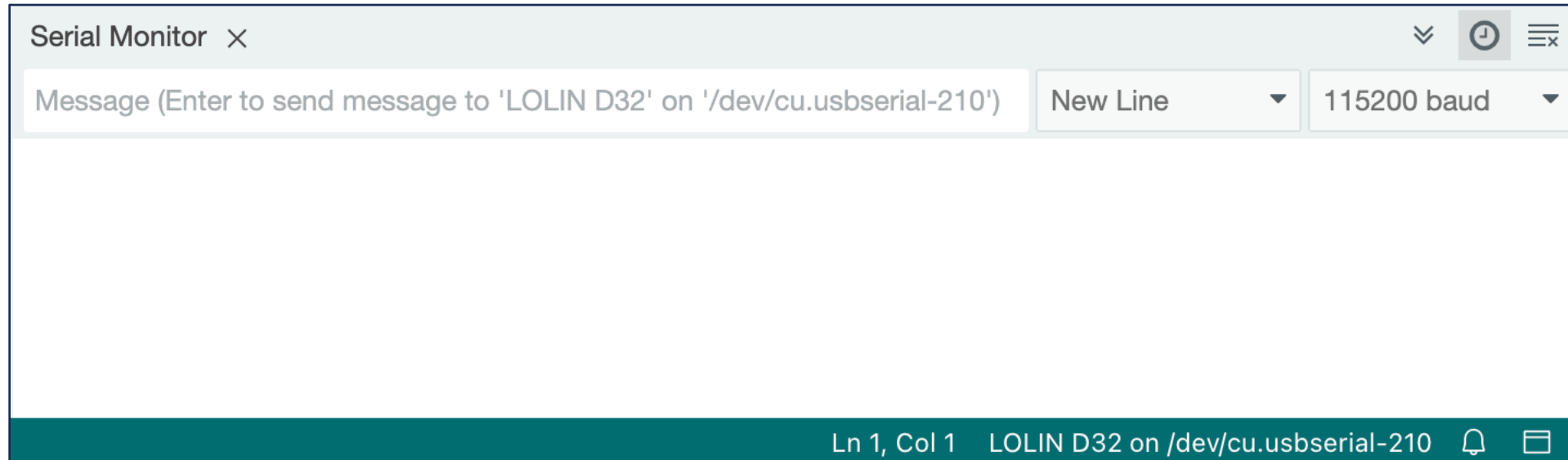
The status bar at the bottom indicates 'Ln 1, Col 1' and 'No board selected'.

# Pastikan Parameter sesuai

- Board
- Port (COM 4: Windows, /dev/... Linux dan Mac)
- Upload Speed “115200”
- Serial Monitor Speed



# Buka Serial Monitor untuk Menampilkan pesan (messages)



Tools => Serial Monitor

# Test Koneksi dengan Program Blink

```
// the setup function runs once when you press reset or power the board
void setup() {
  // initialize digital pin LED_BUILTIN as an output.
  pinMode(LED_BUILTIN, OUTPUT);
}

// the loop function runs over and over again forever
void loop() {
  digitalWrite(LED_BUILTIN, HIGH); // turn the LED on (HIGH is the voltage level)
  delay(1000);                      // wait for a second
  digitalWrite(LED_BUILTIN, LOW);  // turn the LED off by making the voltage LOW
  delay(1000);                      // wait for a second
}
```

***File => Examples => Basics => Blink***

# Verifikasi/Kompilasi dan Upload

- Sebelum Binary code dari Program Sketch dapat diunduh (Upload) ke ESP32, verifikasi dulu, atau kompilasi dan upload.  
Dari Menu Pilih : **Sketch => Verify/Compile, Sketch => Upload**
- Atau dari ICON:



Upload

Verify/Compile

# Penjelasan Program

- Pada `setup()`  
`pinMode(LED_BUILTIN, OUTPUT)`

LED\_BUILTIN adalah macro yang nilainya menunjuk pada internal Pin dari ESP32 (misalnya pin no 2). Pin ini ditentukan sebagai OUTPUT. Instruksi ini dijalankan hanya 1x saja

- Pada `loop()`  
`digitalWrite(LED_BUILTIN, ON)` memberikan sinyal ON pada LED  
`digitalWrite(LED_BUILTIN, OFF)` memberikan sinyal OFF pada LED  
`delay(1000)` Do nothing selama 1000 msec.