

## AITRIP ESP-WROOM-32 ESP32 ESP-32S CP2102

# AITRIP ESP-WROOM-32 ESP32 ESP-32S CP2102 Development Board User Manual

Comprehensive instructions for setup, operation, and technical specifications.

## 1. INTRODUCTION

The AITRIP ESP-WROOM-32 ESP32 ESP-32S CP2102 Development Board is a versatile microcontroller unit designed for a wide range of applications, from IoT projects to embedded systems. It integrates a powerful ESP32 chip with dual-mode Wi-Fi and Bluetooth capabilities, making it ideal for wireless communication and networking. This board features a CP2102 USB-to-UART bridge for easy programming and communication via a Type-C interface. Its compact design and rich set of GPIO pins provide flexibility for various hardware integrations.

## 2. KEY FEATURES

- **Integrated ESP-WROOM-32 Module:** Features the ESP32-D0WD-V3 chip, offering 2.4GHz dual-mode Wi-Fi (802.11b/g/n) and Bluetooth (Classic and BLE) connectivity.
- **Dual-Core Microcontroller:** Equipped with two Xtensa LX6 microprocessors, providing robust processing power for complex tasks.
- **CP2102 USB-to-UART Bridge:** Facilitates reliable serial communication for programming and debugging via the USB Type-C port.
- **30-Pin Design:** Offers a comprehensive set of GPIO pins for connecting various sensors, actuators, and other peripherals.
- **Flexible Operating Modes:** Supports AP (Access Point), STA (Station), and AP+STA coexistence modes for diverse networking applications.
- **Integrated Components:** Includes antenna, RF balun, power amplifier, low noise amplifier, filters, and power management modules for optimized performance.
- **Wide Compatibility:** Compatible with popular development environments such as Arduino IDE and ESP-IDF.

## 3. TECHNICAL SPECIFICATIONS

WiFi + Bluetooth Module: **ESP-32**  
Specifications: **(CP2102)**  
Pin: **30Pin**  
Interface: **TYPE-C**

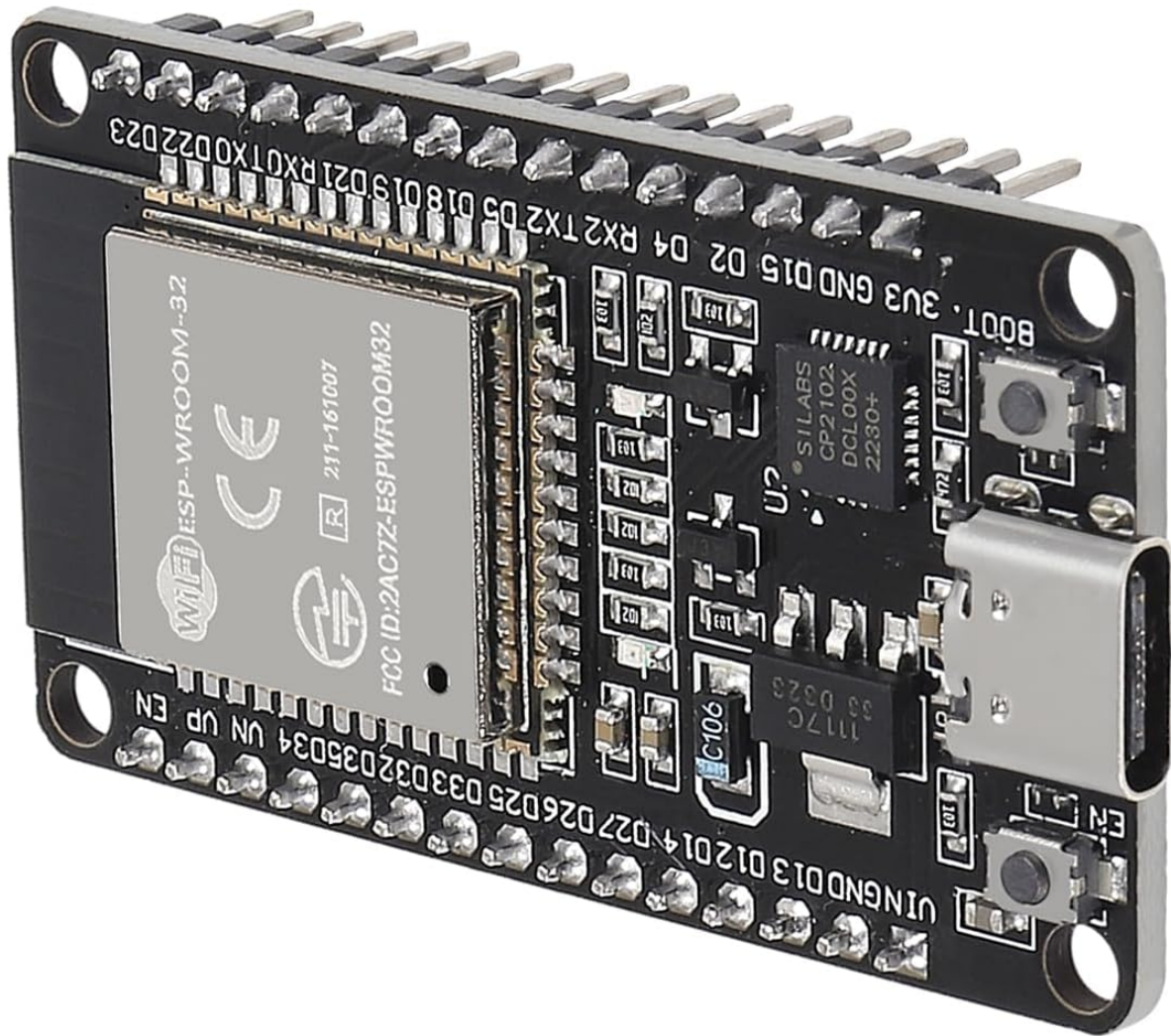


Image: Detailed specifications of the ESP32 development board, highlighting the ESP-32 (CP2102) module, 30-pin configuration, and Type-C interface.

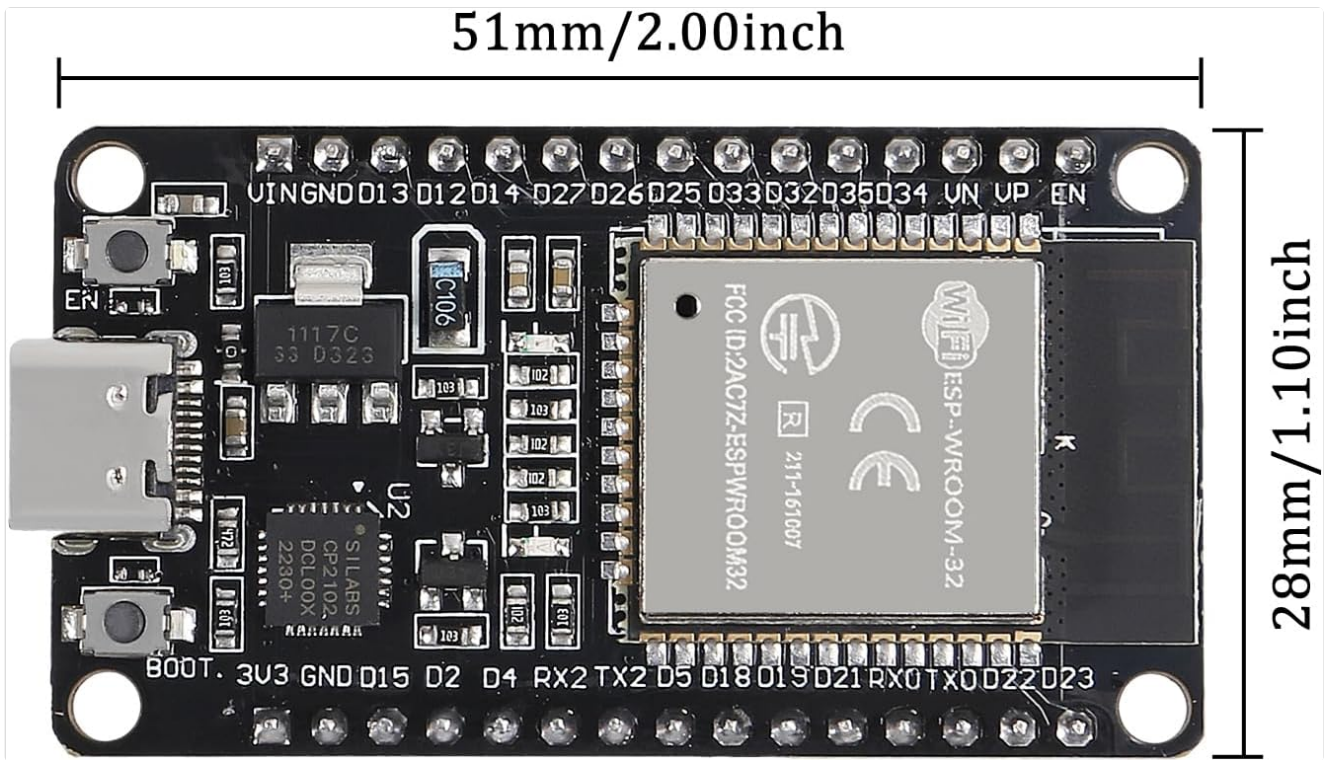


Image: Diagram illustrating the physical dimensions of the ESP32 development board, showing a length of 51mm (2.00 inches) and a width of 28mm (1.10 inches).

Specification	Value
Model Name	ESP-WROOM-32 ESP32 ESP-32S Development Board
Microcontroller	ESP32-D0WD-V3
USB-to-UART Bridge	CP2102
Interface	USB Type-C
Wireless Connectivity	2.4GHz Wi-Fi (802.11b/g/n), Bluetooth (Classic and BLE)
Operating System Support	FreeRTOS
Number of Processors	2 (Dual-Core)
RAM	LPDDR4
Pin Count	30 Pins
Dimensions	51mm x 28mm (approx. 2.00 x 1.10 inches)
Item Weight	1.76 ounces

## 4. PACKAGE CONTENTS



Image: A package containing five AITRIP ESP-WROOM-32 ESP32 ESP-32S CP2102 Development Boards, as typically supplied in a multi-pack.

Each package contains:

- AITRIP ESP-WROOM-32 ESP32 ESP-32S CP2102 Development Board (quantity as purchased, e.g., 5 pieces)

## 5. SETUP GUIDE

### 5.1. Driver Installation

The ESP32 development board uses a CP2102 USB-to-UART bridge chip for communication with your computer. Before programming, you may need to install the appropriate drivers.

1. **Identify the Chip:** The board typically uses a Silicon Labs CP2102 chip.
2. **Download Drivers:** Visit the official Silicon Labs website ([silabs.com/developers/usb-to-uart-bridge-vcp-drivers](https://www.silabs.com/developers/usb-to-uart-bridge-vcp-drivers)) to download the latest CP210x Universal Windows Driver (or equivalent for your operating system).
3. **Install Drivers:** Follow the on-screen instructions to install the drivers. Restart your computer if prompted.
4. **Verify Installation:** Connect the ESP32 board to your computer using a USB Type-C cable. Check your

device manager (Windows) or system information (macOS/Linux) to confirm the COM port or serial device is recognized.

## 5.2. Integrated Development Environment (IDE) Setup

The ESP32 board can be programmed using various IDEs. Arduino IDE is a popular choice for its ease of use.

1. **Install Arduino IDE:** Download and install the Arduino IDE from the official Arduino website ([arduino.cc/en/software](https://arduino.cc/en/software)).
2. **Add ESP32 Board Manager URL:** In Arduino IDE, go to **File > Preferences**. In the "Additional Boards Manager URLs" field, add: `https://raw.githubusercontent.com/espressif/arduino-esp32/gh-pages/package_esp32_index.json`
3. **Install ESP32 Boards:** Go to **Tools > Board > Boards Manager...** Search for "ESP32" and install the "esp32 by Espressif Systems" package.
4. **Select Board:** After installation, go to **Tools > Board > ESP32 Arduino** and select "ESP32 Dev Module".

## 5.3. Connecting the Board

Connect the ESP32 development board to your computer using a high-quality USB Type-C data cable. Ensure the cable is capable of both power and data transfer.

Video: An official product video demonstrating the unboxing and initial handling of the ESP-32 Development Board with a USB-C interface, showing the board being removed from its anti-static packaging and inspected.

# 6. OPERATING INSTRUCTIONS

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## 6.1. Basic Programming and Upload

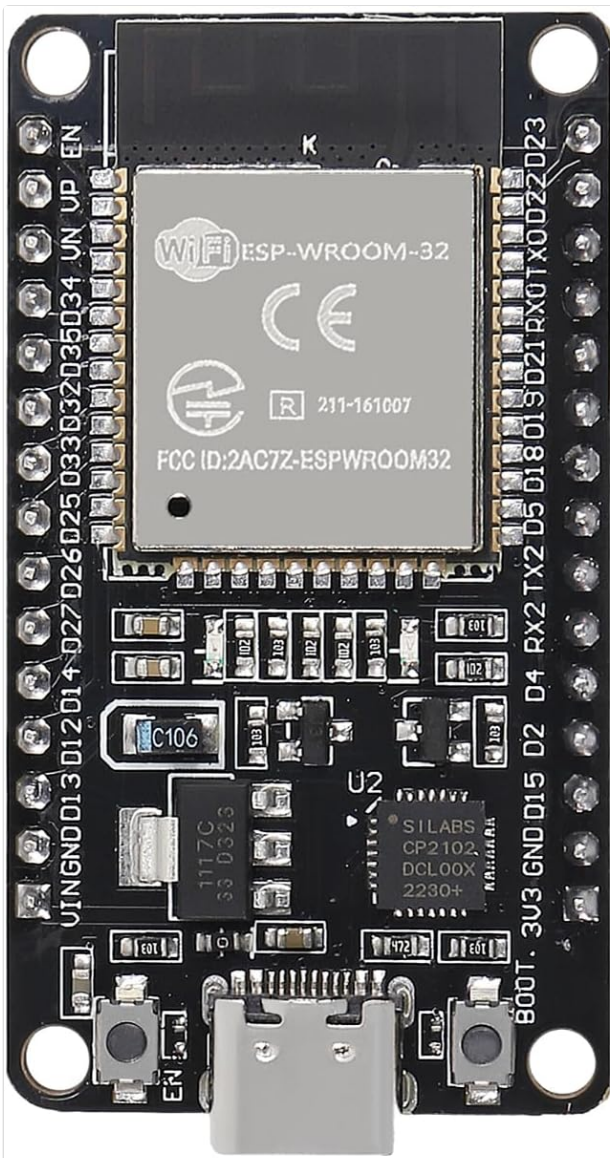
Once your IDE is set up and the board is connected, you can upload your first program.

1. **Open an Example Sketch:** In Arduino IDE, go to **File > Examples > 01.Basics > Blink** to open a simple LED blinking program.
2. **Select Port:** Go to **Tools > Port** and select the COM port corresponding to your ESP32 board.
3. **Upload Sketch:** Click the "Upload" button (right arrow icon) in the Arduino IDE. The IDE will compile the code and upload it to the board. During upload, you might need to press and hold the "BOOT" button on the ESP32 board, then press "EN" (reset), and release "BOOT" when the upload starts.
4. **Monitor Serial Output:** Open the Serial Monitor (magnifying glass icon) to view output from your program. Ensure the baud rate matches your sketch.

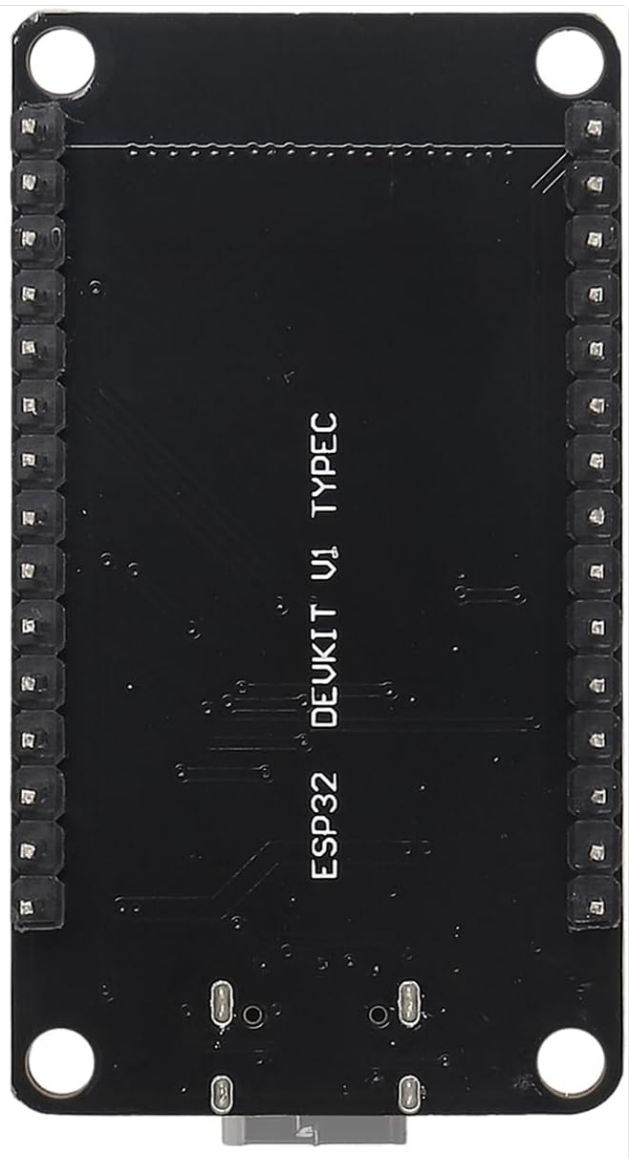
## 6.2. WiFi and Bluetooth Configuration

The ESP32's core functionality lies in its wireless capabilities. Refer to the extensive documentation and examples available for ESP32 on how to configure Wi-Fi in STA (connect to an existing network), AP (create its own network), or AP+STA modes, and how to use Bluetooth Classic or Bluetooth Low Energy (BLE).

## 6.3. Pinout Reference



**FRONT**



**BACK**

Image: Front and back views of a single ESP32 development board, showing the ESP-WROOM-32 module, CP2102 chip, USB-C port, and pin labels on the front, and the 'ESP32 DEVKIT V1 TYPE-C' label on the back.

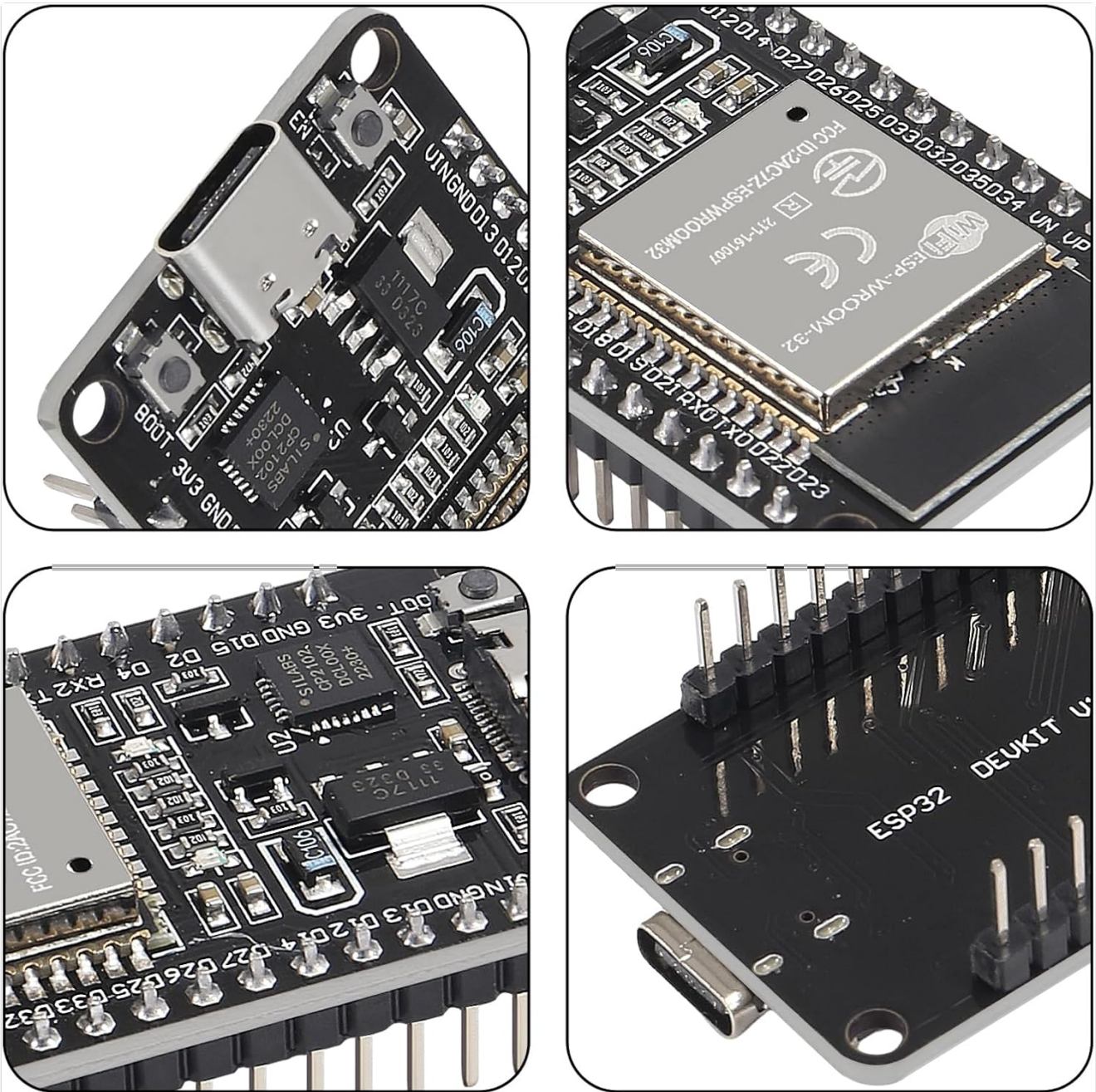


Image: A close-up view of the ESP32 development board, detailing the USB-C port, reset and boot buttons, the CP2102 chip, and the ESP-WROOM-32 module with its metallic shield.

The ESP32 development board features 30 pins, including GPIOs, power pins (3.3V, 5V, GND), and communication pins (UART, SPI, I2C). Consult the official ESP32 documentation or community-generated pinout diagrams for detailed information on each pin's function and capabilities. Proper understanding of the pinout is crucial for connecting external components and designing circuits.

## 7. MAINTENANCE

To ensure the longevity and reliable operation of your AITRIP ESP32 Development Board, follow these maintenance guidelines:

- **Handle with Care:** Avoid dropping the board or subjecting it to physical shock.
- **Prevent Electrostatic Discharge (ESD):** Always handle the board by its edges and consider using an anti-static wrist strap, especially when working in dry environments.
- **Keep Clean:** Protect the board from dust, dirt, and debris. Use compressed air or a soft brush to gently clean the surface if necessary.

- **Avoid Moisture:** Keep the board away from liquids and high humidity to prevent short circuits and corrosion.
- **Proper Storage:** When not in use, store the board in its original anti-static packaging or a protective enclosure.
- **Power Supply:** Always use a stable and appropriate power supply (typically 5V via USB-C) to prevent damage.

## 8. TROUBLESHOOTING

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Here are some common issues and their potential solutions:

- **Board Not Detected by Computer:**
  - Ensure CP2102 drivers are correctly installed (refer to Section 5.1).
  - Try a different USB Type-C cable; some cables are charge-only.
  - Test with a different USB port on your computer.
  - Restart your computer.
- **Failed to Upload Sketch:**
  - Verify the correct board type ("ESP32 Dev Module") and COM port are selected in the Arduino IDE.
  - Ensure the baud rate for upload is set correctly (e.g., 115200).
  - During upload, press and hold the "BOOT" button, then press "EN" (reset), and release "BOOT" when the upload process begins.
  - Check for any error messages in the Arduino IDE console for specific clues.
- **WiFi/Bluetooth Connection Issues:**
  - Double-check your network credentials (SSID, password) in your code.
  - Ensure the ESP32 is within range of the Wi-Fi access point or Bluetooth device.
  - Verify that your code correctly initializes and manages the Wi-Fi/Bluetooth modules.
  - Reset the board by pressing the "EN" button.
- **Unexpected Behavior/Crashes:**
  - Review your code for logical errors or memory issues.
  - Ensure your power supply is stable and sufficient for the board and any connected peripherals.
  - Check for loose connections or faulty wiring if external components are used.

## 9. WARRANTY AND SUPPORT

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AITRIP products are designed for reliability and performance. For specific warranty information, please refer to the terms and conditions provided at the time of purchase or contact your retailer. If you encounter any issues or require technical assistance, please reach out to AITRIP customer support through the vendor's official channels or the platform where the product was purchased. Provide your product model and a detailed description of the issue for efficient support.

