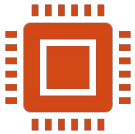
INTRODUCTION TO ESP32 MICROCONTROLLER

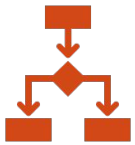
Beginner's Guide + Pinouts Overview

WHAT IS ESP32?

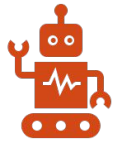


• Low-cost, low-power microcontroller

• Built-in Wi-Fi + Bluetooth



• Multiple GPIO, ADC, DAC, PWM



• Ideal for IoT, robotics, embedded projects

ESP32 FEATURES

- • Dual-core 32-bit processor
- • 520 KB SRAM, up to 16 MB Flash
- • 34 GPIO pins
- • ADC (18 channels, 12-bit)
- • 2 × DAC, PWM on all pins
- • UART, I2C, SPI support

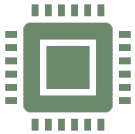
ESP32 DEVELOPMENT BOARDS

- • ESP32-WROOM-32 (most common)
- • ESP32 DevKit v1 (NodeMCU-32S)
- • ESP32-S2, ESP32-C3, ESP32-S3

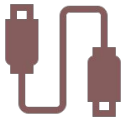
SETTING UP ESP32

• Install Arduino IDE

• Add ESP32 boards via Board Manager URL



• Select board (ESP32 Dev Module)



• Connect with USB cable

FIRST PROGRAM – BLINK LED

```
int led = 2;

void setup() {
  pinMode(led, OUTPUT);
}

void loop() {
  digitalWrite(led, HIGH); delay(1000);
  digitalWrite(led, LOW);  delay(1000);
}
```

ESP32 PINOUT OVERVIEW

- Power pins (3.3V, GND, VIN)
- Digital I/O pins
- ADC & DAC pins
- Communication pins (UART, I2C, SPI)
- Special boot pins

GPIO USAGE TIPS

- Avoid GPIO 6–11 (used for flash)
- Bootstrapping pins: GPIO 0, 2, 15
- Safe GPIOs: 4, 5, 18, 19, 21–23, 25–27, 32–39

SUMMARY

- • ESP32 = powerful + versatile MCU
- • Supports Wi-Fi, Bluetooth, ADC, DAC, PWM
- • Great for IoT and embedded projects
- • Easy to program with Arduino IDE