ESP32 Microcontroller — Integration and Programming Guide
Introduction
The ESP32 is a low-cost microcontroller with Wi-Fi and Bluetooth, ideal for IoT projects.
Key Features
- Dual-core 32-bit CPU
- Built-in Wi-Fi and Bluetooth
- GPIO pins
- Low-power modes
- Interfaces: UART, SPI, I2C, PWM, ADC, DAC
Development Environments
- Arduino IDE
- ESP-IDF
- MicroPython
Setup (Arduino Example)
1. Install Arduino IDE and ESP32 board package.
2. Connect ESP32 via USB.
3. Select 'ESP32 Dev Module'.
4. Write and upload code.
Example Code
#include
const char* ssid = "MyWiFi";
const char* password = "password";
void setup() {
Serial.begin(115200);
WiFi.begin(ssid, password);
while (WiFi.status() != WL_CONNECTED) {
delay(1000);
Serial.println("Connecting...");
}
Serial.println("Connected!");
}
void loop() {}
Troubleshooting
Problem	Cause	Fix
Upload fails	Wrong COM port	Select correct port
Wi-Fi not connecting	Wrong credentials	Check SSID/password
Reboot loop	Power issue	Stable 5V source
Integration Tips
- Use MQTT or HTTP.
- Combine with sensors.
- Power via USB or Li-ion battery.
Best Practices
- Keep firmware updated.
- Use non-blocking loops.
- Use deep sleep.