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## [1] Arduino Sketch Configuration

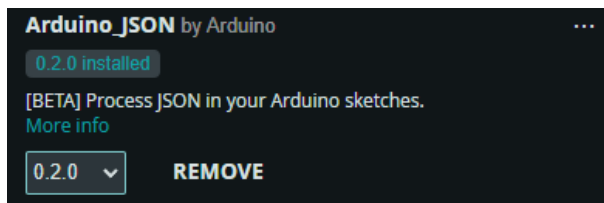
*Disclaimer: This project was developed using Arduino IDE 2.3.3 version*

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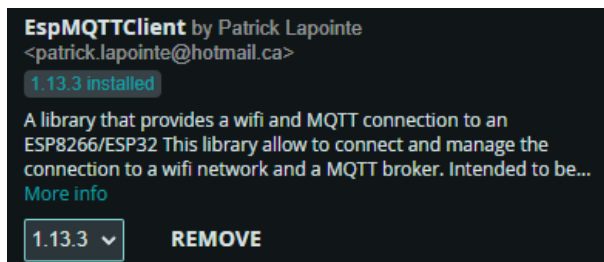
### Step 1: Install Required Libraries

1. Open the Arduino IDE.
2. Navigate to **Sketch > Include Library > Manage Libraries**.
3. Use the library manager to search for and install the following libraries:

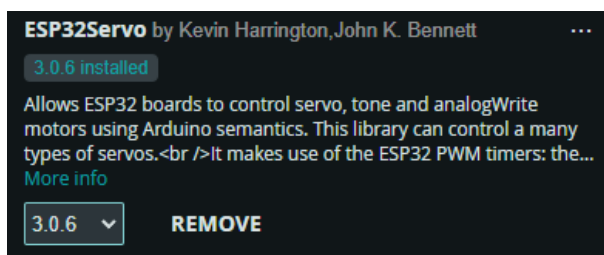
- **Arduino\_JSON** by Arduino



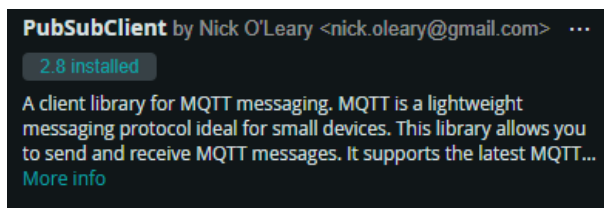
- **EspMQTTClient** by Patrick Lapointe



- **ESP32Servo** by Kevin Harrington



- **PubSubClient** by Nick O'Leary

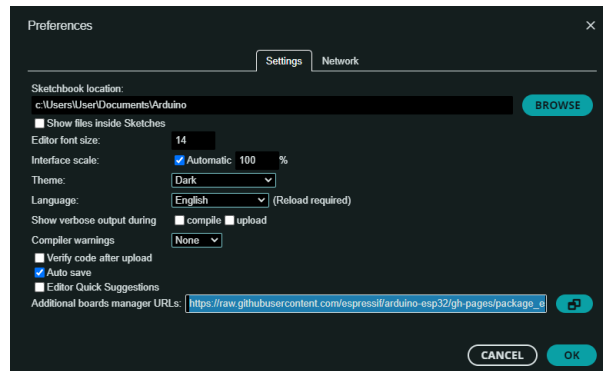


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## Step 2: NodeMCU-32S Board Configuration

1. Navigate to **File > Preferences**.
2. In the Additional Boards Manager URLs textbox, paste the following URL:

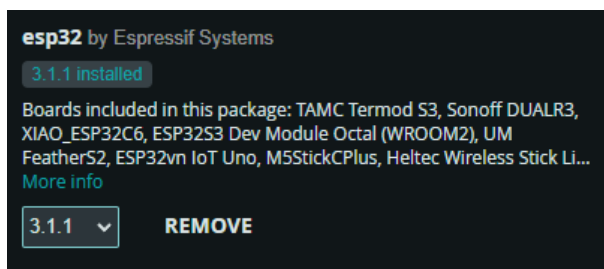
[https://raw.githubusercontent.com/espressif/arduino-esp32/gh-pages/package\\_esp32\\_index.json](https://raw.githubusercontent.com/espressif/arduino-esp32/gh-pages/package_esp32_index.json)



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## Step 3: Install ESP32 Board Manager

1. Navigate to **Tools > Board > Boards Manager**.
2. Use the search bar to search for **esp32** and install:
  - **ESP32 boards manager** by Espressif Systems.



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## Step 4: Configure Board and Port

1. To choose the board, navigate to **Tools > Board > esp32 > NodeMCU-32S**
2. To choose the COM port, **Tools > Port > Your COM Port** (e.g., COM5)
3. Connect ESP32 board to the computer.

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## Step 5: Upload Code

1. Open the **WakeEase.ino** file in Arduino IDE.
2. Update the following values in the code:

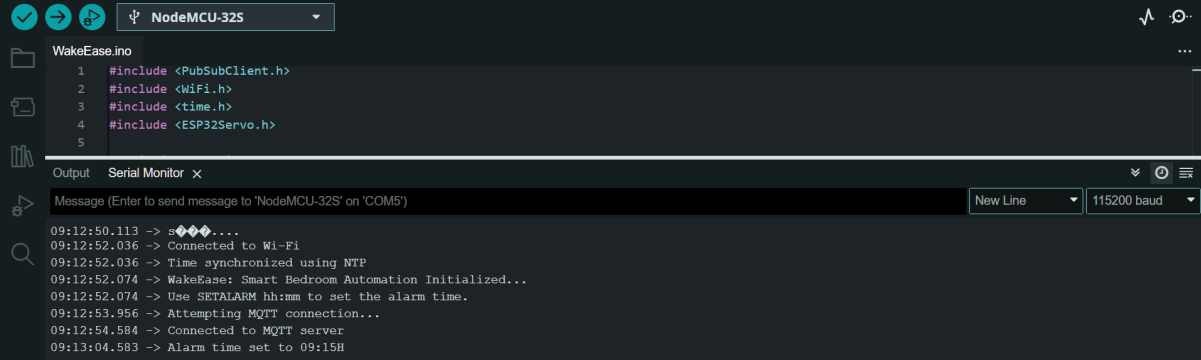
*Important Notes: The ESP32 only supports the 2.4GHz Wi-Fi band (not compatible with 5GHz). If using a dual-band hotspot (2.4GHz and 5GHz), configure it to either 2.4GHz only or Mixed mode (both 2.4GHz and 5GHz enabled).*

- **WIFI\_SSID:** Your Wi-Fi network name.
- **WIFI\_PASSWORD:** Your Wi-Fi network password.
- **MQTT\_SERVER:** Enter the external IP address of your VM instance, which can be found on the Google Cloud Platform. Ensure that the VM instance has been properly set up beforehand.

```
1  #include <PubSubClient.h>
2  #include <WiFi.h>
3  #include <time.h>
4  #include <ESP32Servo.h>
5
6  // Wi-Fi Credentials
7  const char* ssid = "yourwifi"; // Replace with your Wi-Fi SSID
8  const char* password = "yourwifipassword"; // Replace with your Wi-Fi password
9
10 // MQTT Credentials
11 const char* MQTT_SERVER = "yourExternalIP"; // Replace with your VM External IP
12 const int MQTT_PORT = 1883; // Non-TLS communication port
13 WiFiClient espClient;
14 PubSubClient client(espClient);
```

3. Click the **Upload** button in Arduino IDE.
4. Once the upload is complete, the code will execute automatically.

*You should see the output shown in the figure below if the setup and connection are configured correctly without any issues.*



The screenshot shows the Arduino IDE interface. The top toolbar has the 'Upload' button (a right-pointing arrow) highlighted. The file 'WakeEase.ino' is open in the editor, showing the same code as the previous block. Below the editor is the 'Serial Monitor' window, which is active and shows the following output:

```
09:12:50.113 -> s...
09:12:52.036 -> Connected to Wi-Fi
09:12:52.036 -> Time synchronized using NTP
09:12:52.074 -> WakeEase: Smart Bedroom Automation Initialized...
09:12:52.074 -> Use SETALARM hh:mm to set the alarm time.
09:12:53.956 -> Attempting MQTT connection...
09:12:54.584 -> Connected to MQTT server
09:13:04.583 -> Alarm time set to 09:15H
```