Upload Instructions for Air Quality Monitor

This guide explains how to upload the provided Arduino code to your board and set up the hardware.

1. Required Components

- Arduino board (Uno, Nano, Mega, etc.)
- DHT11 temperature & humidity sensor
- MQ135 air quality sensor
- SSD1306 OLED display (128×64, I2C)
- Jumper wires and breadboard

2. Wiring

Connect the components as follows:

Component	Pin	Arduino Pin
DHT11	VCC	5V
DHT11	GND	GND
DHT11	OUT	Digital 8
MQ135	VCC	5V
MQ135	GND	GND
MQ135	AOUT	Analog A0
OLED	VCC	5V
OLED	GND	GND
OLED	SDA	A4 (SDA)

Component	Pin	Arduino Pin
OLED	SCL	A5 (SCL)

Note: If using a different Arduino model, check the correct I2C pins (e.g., for Mega: SDA = 20, SCL = 21).

3. Software Setup

Install Arduino IDE

- Download from arduino.cc
- Install and open the IDE

Install Required Libraries

Go to **Sketch** → **Include Library** → **Manage Libraries** and install:

- `DHT sensor library` by Adafruit (version ≥1.4.4)
- `Adafruit GFX Library` by Adafruit
- `Adafruit SSD1306` by Adafruit

4. Prepare the Code

1. Copy the complete code from the provided file.
2. In Arduino IDE, create a new sketch (**File** → **New**).
3. Delete any default text and paste the copied code.
4. Save the sketch (e.g., `AirMonitor`).

5. Upload to Arduino

Select Board and Port

- **Tools** → **Board** → choose your Arduino model (e.g., "Arduino Uno").

- **Tools** → **Port** → select the correct COM port (Windows) or `/dev/cu...` (Mac/Linux).

Compile and Upload

- Click the **Verify** button (checkmark) to compile. Fix any errors if they appear (usually missing libraries).
- Click the **Upload** button (right arrow). Wait for "Done uploading" message.

6. Verify Operation

Serial Monitor

- Open **Tools** → **Serial Monitor** (set baud rate to **9600**).
- You should see calibration messages and then periodic readings:

```
text

Calibrating MQ135, keep sensor in clean air...
MQ135 baseline set to: 312
Temp: 24.5 C | Humidity: 55.0 % | Air: 320 (baseline: 312)
```

OLED Display

- After a brief "Calibrating..." message, the display should show:
    - Temperature, Humidity, Air quality value (with deviation from baseline)
    - Status line: "OK ✓" or "BAD AIR ✗" (depending on air quality)

7. Troubleshooting

Problem	Possible Solution
OLED not found	Check I2C address (default 0x3C). Use an I2C scanner sketch to verify. If address is 0x change `OLED_ADDRESS` in code.

Problem	Possible Solution
DHT read fails	Verify wiring (pin 8). Ensure sensor is 5V compatible. Try adding a 10kΩ pull-up resis on data line.
MQ135 values erratic	Allow sensor to warm up for 2-3 minutes. Adjust baseline by increasing `CALIBRATION_SAMPLES` or adding a warm-up delay.
Upload fails	Check that correct board and port are selected. Try pressing the Arduino's reset butt just before uploading.

8. Customization

- **Air quality threshold**: In `updateDisplay()`, change `diff > 100` to a value that matches your environment.
- **Reading interval**: Modify `READING_INTERVAL` (in milliseconds).
- **I2C pins**: If using non-default pins, add `Wire.begin(SDA, SCL);` in `setup()` with your pin numbers.