

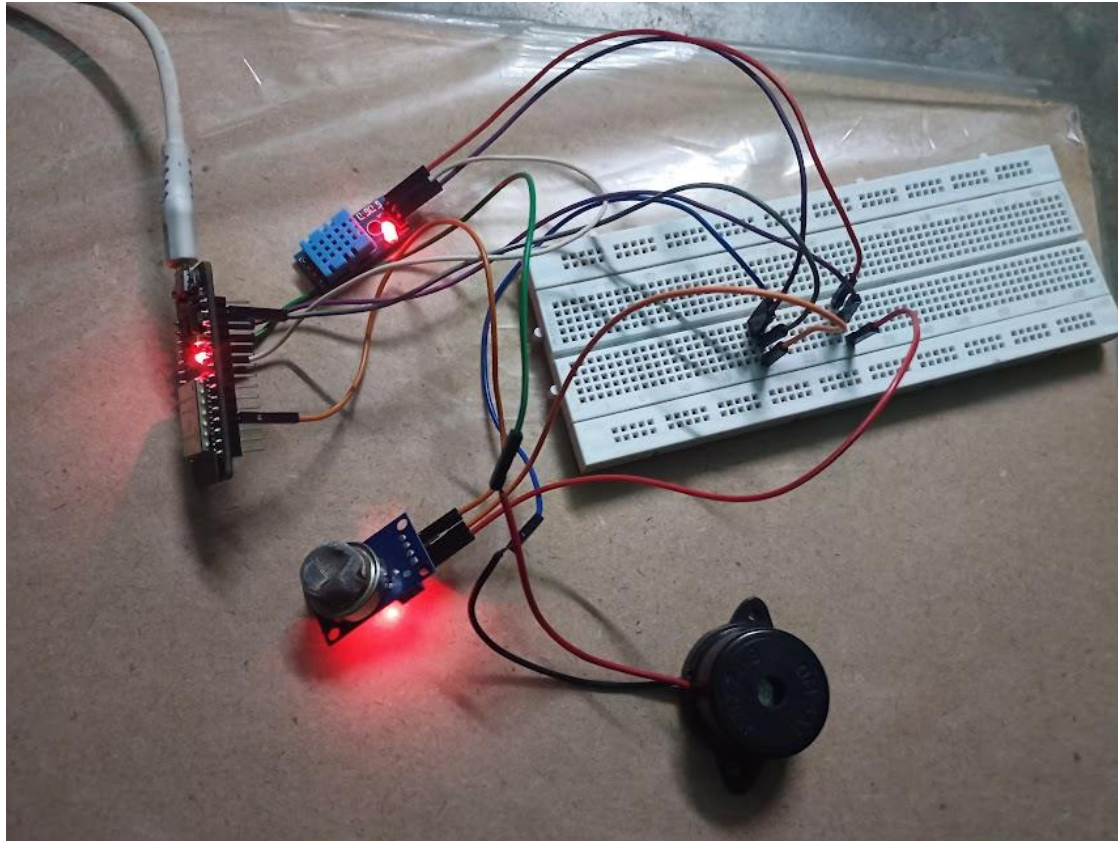
Indoor Air Quality

The project involves the evaluation of indoor air quality (IAQ) in residential, commercial, and institutional settings. The main goals of such a campaign will be to pinpoint the most common indoor pollutants (e.g., CO₂) and relative humidity, characterize sources and assess impact on occupants in terms of health and comfort.

The project seeks to offer timely actionable insights for better air quality management by taking advantage of sensor-based monitoring, data analytics and risk analysis methodologies. Negative health effects of poor IAQ are broad and include instant short-term symptoms such as headaches and eye irritation, lethargy and sick building syndrome through chronic conditions. Household cleaning products and heating systems, as well as poor ventilation, are common contributors to indoor air pollution.

Ensuring harmonious IAQ includes strategies for continuous ventilation, management of contaminant sources, air cleaning or filtration, and adjustment of the overall humidity. Good IAQ management promotes health, productivity, and quality of life, and is a key consideration in the design, construction, operation and maintenance of both new and existing buildings. Results from this project will assist in the creation of healthier homes by helping informed -decisions and practical intervention.

Hardware Implementation:



Output:

```
sketch_julia | Arduino IDE 2.3.6
File Edit Sketch Tools Help

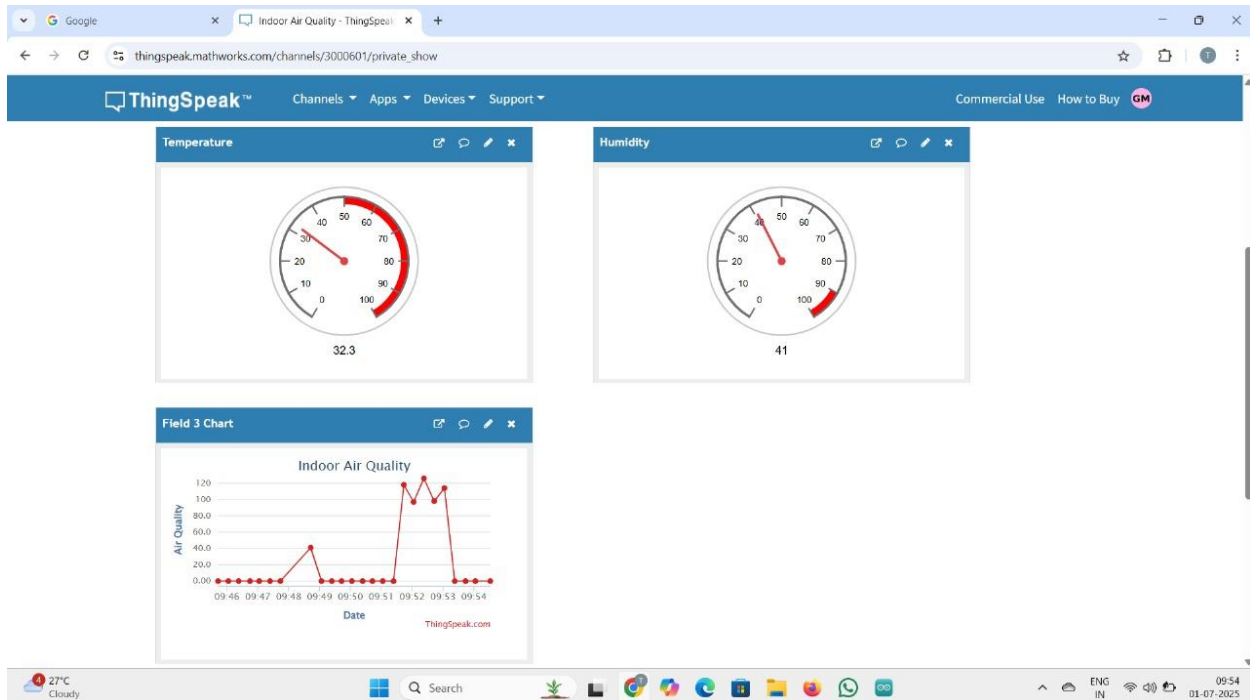
ESP32 Dev Module

sketch_julia.ino
20 const char* server = "http://api.thingspeak.com/update ";
21
22 unsigned long lastPostTime = 0;
23 unsigned long postInterval = 20000; // 20 seconds (minimum Thingspeak limit)
24 unsigned long lastCheckTime = 0;
25 unsigned long checkInterval = 15000; // check remote buzzer command every 15 sec
26
27 void setup() {
28   Serial.begin(9600);
29   dht.begin();
30   pinMode(BUZZER_PIN, OUTPUT);
31   digitalWrite(BUZZER_PIN, LOW);
32
33   WiFi.begin(WIFI_SSID, WIFI_PASS);
34   Serial.print("Connecting to WiFi");
35
36   while (!WiFi.isConnected()) {
37     delay(1000);
38   }
39   Serial.println("WiFi connected");
40 }
41
42 void loop() {
43   // Send data to Thingspeak
44   if (millis() - lastPostTime > postInterval) {
45     float temp = dht.readTemperature();
46     float hum = dht.readHumidity();
47     float AQI = 110;
48     String payload = "temp=" + String(temp, 1) + "&hum=" + String(hum, 1) + "&AQI=" + String(AQI);
49     HTTPClient http;
50     http.begin(server);
51     http.POST(payload);
52     lastPostTime = millis();
53   }
54
55   // Check remote buzzer command
56   if (millis() - lastCheckTime > checkInterval) {
57     String url = server + "?field=4&value=1";
58     HTTPClient http;
59     http.begin(url);
60     http.GET();
61     lastCheckTime = millis();
62   }
63 }

Output Serial Monitor X
Message (Enter to send message to 'ESP32 Dev Module' on 'COM4') New Line 9600 baud

09:51:25.787 -> Data sent to Thingspeak.
09:51:32.121 -> Error getting Field 4 value.
09:51:44.772 -> Temp: 32.30 °C, Hum: 41.00 %, AQI: 110
09:51:46.028 -> Data sent to Thingspeak.
09:51:47.299 -> Error getting Field 4 value.
09:52:01.793 -> Error getting Field 4 value.
09:52:04.776 -> Temp: 32.30 °C, Hum: 41.00 %, AQI: 97
09:52:05.686 -> Data sent to Thingspeak.
09:52:17.164 -> Error getting Field 4 value.
09:52:24.769 -> Temp: 32.30 °C, Hum: 41.00 %, AQI: 126
09:52:25.549 -> Data sent to Thingspeak.
09:52:31.521 -> Error getting Field 4 value.
09:52:44.600 -> Temp: 32.30 °C, Hum: 41.00 %, AQI: 98
09:52:45.449 -> Data sent to Thingspeak.
09:52:47.088 -> Error getting Field 4 value.
09:53:02.608 -> Error getting Field 4 value.
09:53:04.609 -> Temp: 32.30 °C, Hum: 41.00 %, AQI: 114
```

Cloud Integration and Data Visualization:



Web Application:

