

**IOT PROJECT REPORT**

**TOPIC**

**DRONE BASED REMOTE SENSING**

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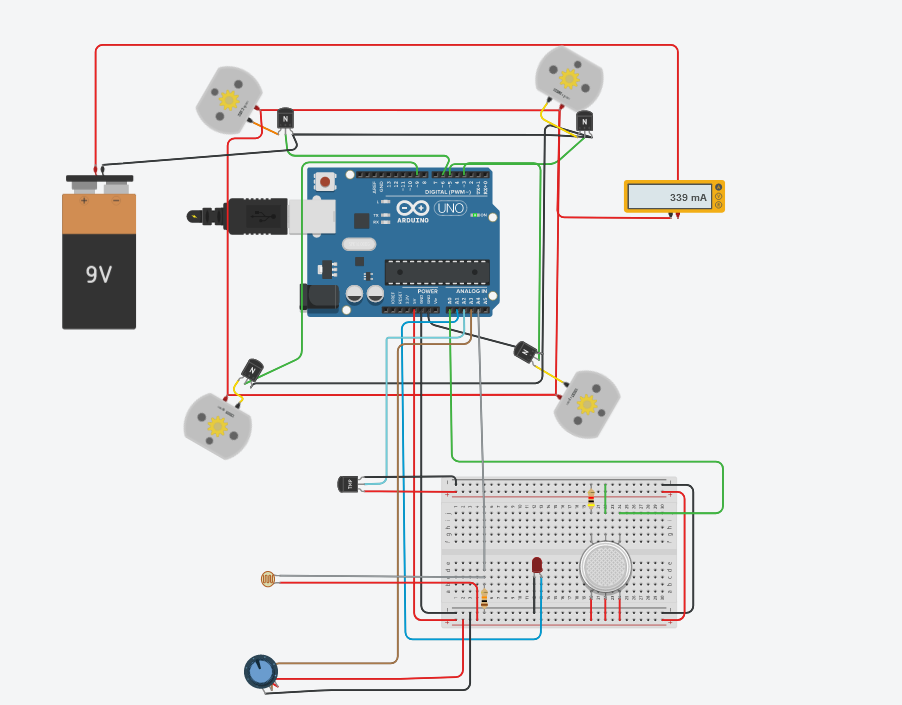
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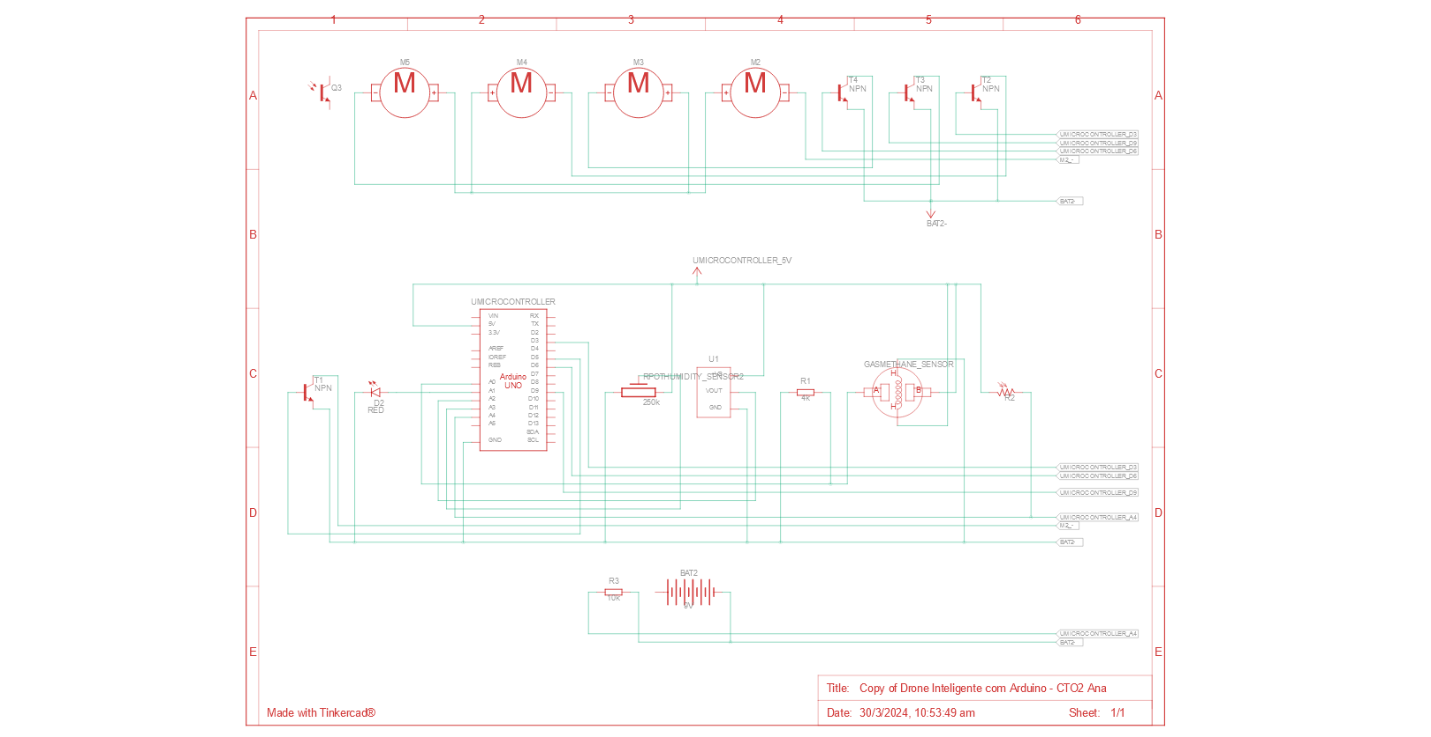
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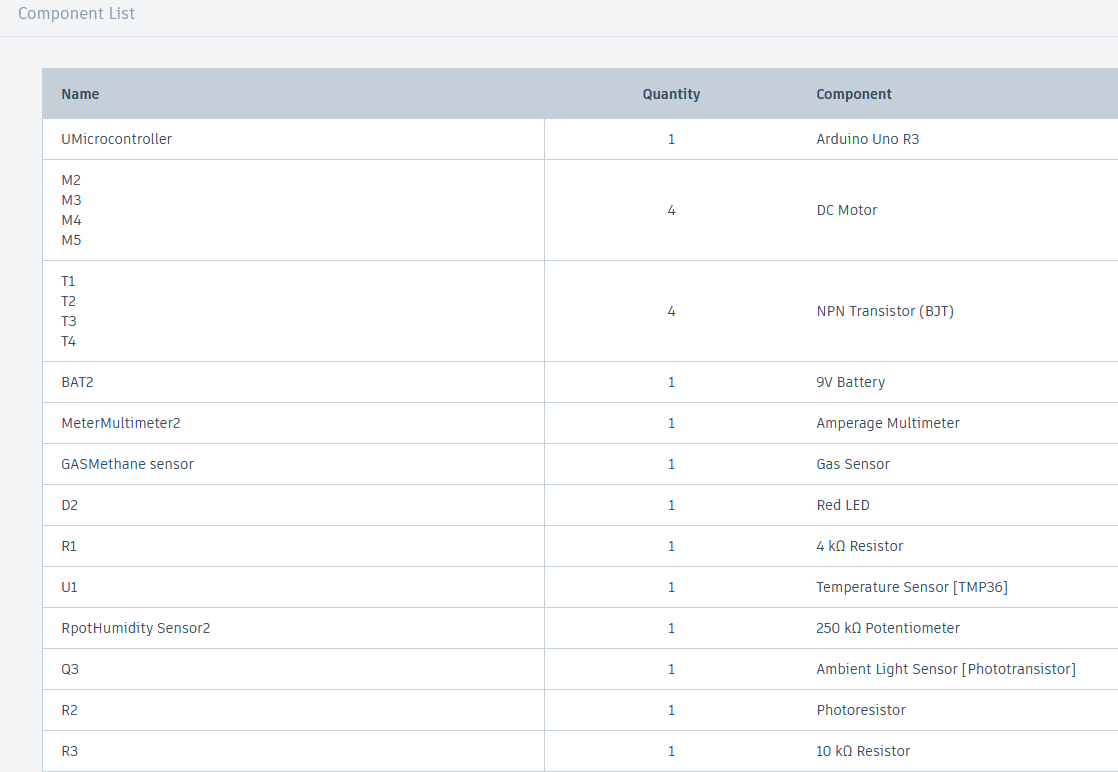
**Abstract:** Drone-based remote sensing technology has revolutionized data collection in various fields, offering unparalleled access to hard-to-reach areas and enabling high-resolution data acquisition. In this report, we explore the integration of humidity, temperature, and gas sensors onto drones for remote environmental monitoring applications. We discuss the importance of these sensors, their deployment on drone platforms, data collection strategies, data processing techniques, and potential applications. Additionally, we highlight the advantages and challenges associated with drone-based remote sensing using these sensors and provide insights into future research directions.

**1. Introduction:** Drone technology has transformed the field of remote sensing by offering a cost-effective and efficient means of data collection. Traditional methods of environmental monitoring often face challenges in accessing remote or hazardous areas. However, drones equipped with various sensors provide a solution to these challenges by enabling real-time data acquisition. In this report, we focus on the integration of humidity, temperature, and gas sensors onto drone platforms for environmental monitoring applications.

**2. Architecture Diagram and Components Required:**







**3. Importance of Humidity, Temperature, and Gas Sensors in Remote Sensing:** Humidity, temperature, and gas sensors play crucial roles in understanding environmental conditions and detecting changes in atmospheric composition. These sensors provide valuable data for applications such as weather forecasting, air quality monitoring, agricultural management, and disaster response. Humidity sensors measure the moisture content in the air, temperature sensors monitor ambient temperature, and gas sensors detect the presence of specific gases in the atmosphere.

**4. Integration of Sensors onto Drone Platforms:** Integrating humidity, temperature, and gas sensors onto drone platforms requires careful consideration of factors such as sensor accuracy, payload capacity, power consumption, and data transmission capabilities. Sensor selection and placement are critical to ensure reliable data collection during flight operations. Additionally, the integration process involves designing custom mounts or enclosures for the sensors to protect them from external elements and minimize interference with drone aerodynamics.

**5. Data Collection Strategies:** Drone-based data collection strategies involve planning flight missions, defining survey areas, and optimizing sensor configurations for desired parameters. Mission planning software facilitates autonomous flight, waypoint navigation, and sensor control during data acquisition. It is essential to consider factors such as flight altitude, speed, and overlap between sensor measurements to ensure comprehensive coverage and accurate data collection.

**6. Data Processing Techniques:** Processing data collected from humidity, temperature, and gas sensors on drones involves techniques such as data fusion, georeferencing, and statistical analysis. Data fusion combines measurements from multiple sensors to generate integrated datasets for comprehensive analysis. Georeferencing aligns sensor data with geographic coordinates, enabling spatial analysis and visualization. Statistical analysis techniques are used to identify patterns, trends, and anomalies in the collected data.

**7. Applications of Drone-Based Remote Sensing with Humidity, Temperature, and Gas Sensors:** Drone-based remote sensing with humidity, temperature, and gas sensors has diverse applications across various sectors. These include:

* Environmental Monitoring: Assessing air quality, detecting pollutants, and monitoring climate change.
* Agriculture: Monitoring soil moisture, assessing crop health, and optimizing irrigation practices.
* Disaster Response: Assessing damage, identifying hazards, and monitoring air quality during natural disasters.
* Infrastructure Inspection: Detecting leaks, assessing structural integrity, and monitoring environmental conditions in infrastructure.

**8. Tinkercad Code**

int LED = A1;

const int gas = 0;

int MQ2pin = A0;

int sensorPin = 0;

int sensorInput;

float tempVal;

int humiditysensorOutput = 0;

const int light\_out = A4;

const int ldr\_pin = 7;

const int led\_pin = 13;

void setup()

{

Serial.begin(9600);

pinMode(3, OUTPUT);

pinMode(5, OUTPUT);

pinMode(6, OUTPUT);

pinMode(9, OUTPUT);

pinMode(A3, INPUT);

pinMode(ldr\_pin, INPUT);

pinMode(led\_pin, OUTPUT);

analogWrite(3, 200);

analogWrite(5, 200);

analogWrite(6, 50);

analogWrite(9, 200);

}

void loop()

{

Serial.println("----------DRONE FUNCIONAL----------");

sensorInput = analogRead(A2);

tempVal=(float)sensorInput/1024;

tempVal=tempVal\*5;

tempVal=tempVal-0.5;

tempVal=tempVal \*100;

Serial.print("Temperature: ");

Serial.print(tempVal);

Serial.println(" Gas");

humiditysensorOutput = analogRead(A3);

Serial.print("Humidity: ");

Serial.print(map(humiditysensorOutput, 0, 1023, 10, 70));

Serial.println("%");

int light\_val = analogRead(light\_out);

Serial.print("Luminious intensity: ");

Serial.print(light\_val);

Serial.println(" %");

float sensorValue,MQ2pin;

sensorValue = analogRead(MQ2pin);

if(sensorValue >= 500){

digitalWrite(LED,LOW);

Serial.print("Percentage of Gas: ");

Serial.print(sensorValue);

Serial.print(" Excesso de gás no ar!!!! ambiente perigoso");

}

else{

digitalWrite(LED,HIGH);

Serial.print("Percentage of Gas: ");

Serial.println(sensorValue);

}

// LDR Module

if(digitalRead(ldr\_pin) == 1) {

digitalWrite(led\_pin, HIGH);

} else {

digitalWrite(led\_pin, LOW);

}

Serial.println("---------- Fim da ultima leitura dos sensores ----------");

delay(1000);

}

float getsensorValue(int pin){

return (analogRead(pin));

}

**Arduino Code:**

#include <ESP8266WiFi.h>

#include <WiFiClientSecure.h>

const char\* ssid = "Amrita\_CHN";

const char\* password = "amrita@321";

const char\* host = "api.thingspeak.com";

const String apiKey = "95SSTZEPJBPL33OD";

void setup() {

Serial.begin(9600);

connectToWiFi();

}

void loop() {

if (Serial.available()) {

String data = Serial.readStringUntil('\n');

sendDataToThingSpeak(data);

}

delay(1000);

}

void connectToWiFi() {

Serial.println();

Serial.println("Connecting to WiFi...");

WiFi.begin(ssid, password);

int attempts = 0;

while (WiFi.status() != WL\_CONNECTED && attempts < 10) { // Try to connect for 10 seconds

delay(1000);

Serial.print(".");

attempts++;

}

if (WiFi.status() != WL\_CONNECTED) {

Serial.println("Failed to connect to WiFi");

return;

}

Serial.println("");

Serial.println("WiFi connected");

Serial.println("IP address: ");

Serial.println(WiFi.localIP());

}

void sendDataToThingSpeak(String data) {

int commaIndex1 = data.indexOf(',');

int commaIndex2 = data.indexOf(',', commaIndex1 + 1);

int commaIndex3 = data.indexOf(',', commaIndex2 + 1);

String temp = data.substring(0, commaIndex1);

String humidity = data.substring(commaIndex1 + 1, commaIndex2);

String light = data.substring(commaIndex2 + 1, commaIndex3);

String gas = data.substring(commaIndex3 + 1);

WiFiClientSecure client;

if (!client.connect(host, 443)) {

Serial.println("Connection to ThingSpeak failed");

return;

}

String url = "/update?api\_key=" + apiKey + "&field1=" + temp + "&field2=" + humidity + "&field3=" + light + "&field4=" + gas;

client.print(String("GET ") + url + " HTTP/1.1\r\n" +

"Host: " + host + "\r\n" +

"Connection: close\r\n\r\n");

delay(1000); // Wait for server to respond

while (client.available()) {

String line = client.readStringUntil('\r');

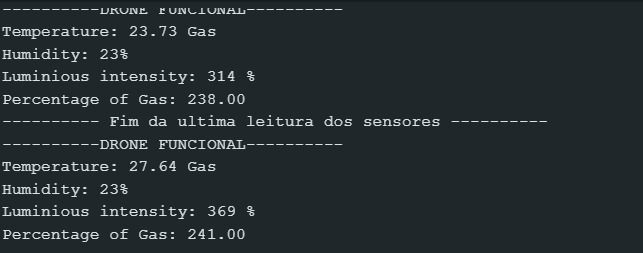
Serial.print(line);

}

client.stop();

}

**9. OUTPUT:**



**10. Future Directions:** Future research directions in drone-based remote sensing with humidity, temperature, and gas sensors include:

* Development of advanced sensor technologies for improved accuracy and reliability.
* Integration of artificial intelligence and machine learning algorithms for automated data analysis.
* Standardization of data formats and protocols for interoperability and data sharing.
* Exploration of novel applications and interdisciplinary collaborations.

**11. Conclusion:** Drone-based remote sensing with humidity, temperature, and gas sensors offers unprecedented opportunities for environmental monitoring and resource management. By leveraging the capabilities of drones and sensor technologies, researchers and practitioners can gain valuable insights into complex environmental processes and make informed decisions for sustainable development.