

Final Code

Team ID	PNT2022TMID05038
Project Name	SmartFarmer - IoT Enabled Smart Farming Application

Source Code :

IoT Code

```
#include <AsyncTCP.h>
#include <ESPAsyncWebServer.h>
#include <WiFi.h>
#include <WiFiClient.h>
#include <PubSubClient.h>
#include <Adafruit_BMP280.h>
#include <math.h>
#include <Wire.h>
#define BMP_SDA 21
#define BMP_SCL 22
#include <DFRobot_DHT11.h>
DFRobot_DHT11 DHT;
#define DHT11_PIN 4
#define rainAnalog 35
#define rainDigital 34
#define moistureDigital 32

Adafruit_BMP280 bmp280;
const char* ssid = "";
const char* password = "";
AsyncWebServer server(80);
AsyncEventSource events("/events");
unsigned long lastTime = 0;
```

```
unsigned long timerDelay = 1000;

int soil;

int rain;

int rainA;

float temperature;

float humidity;

float pressure;

float altitude;

long lastMsg = 0;

int pumpRelayPin = 26;


#define ORG "6jw3v9"
#define DEVICE_TYPE "ESP32"
#define DEVICE_ID "#####"
#define TOKEN "#####"


char servers[] = ORG ".messaging.internetofthings.ibmcloud.com";
char pubTopic1[] = "iot-2/evt/temperature/fmt/json";
char pubTopic2[] = "iot-2/evt/humidity/fmt/json";
char pubTopic3[] = "iot-2/evt/pressure/fmt/json";
char pubTopic4[] = "iot-2/evt/altitude/fmt/json";
char authMethod[] = "use-token-auth";
char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;


WiFiClient wifiClient;

PubSubClient client(servers, 1883, NULL, wifiClient);
```

```
// Init BME280
void initBME() {
  if (!bmp280.begin(0x76)) {
    Serial.println("Could not find a valid BMP280 sensor, check wiring!");
    while (1);
  }
}
```

```
void getSensorReadings() {
  DHT.read(DHT11_PIN);
  temperature = DHT.temperature;
  humidity = DHT.humidity;
  pressure = bmp280.readPressure() / 100;
  soil = digitalRead(moistureDigital);
  rain = digitalRead(rainDigital);
  rainA = analogRead(rainAnalog);
  altitude = bmp280.readAltitude(1011.18);
  if(soil == 1){
    digitalWrite(pumpRelayPin, LOW);
  }
  else{
    digitalWrite(pumpRelayPin, HIGH);
  }
}
```

```
// Initialize WiFi
void initWiFi() {
  WiFi.mode(WIFI_STA);
```

```
WiFi.begin(ssid, password);  
Serial.print("Connecting to WiFi ..");  
while (WiFi.status() != WL_CONNECTED) {  
    Serial.print('.');  
    delay(1000);  
}  
Serial.println(WiFi.localIP());  
}
```

```
String processor(const String& var) {  
    getSensorReadings();  
    //Serial.println(var);  
    if (var == "TEMPERATURE") {  
        return String(temperature);  
    }  
    else if (var == "HUMIDITY") {  
        return String(humidity);  
    }  
    else if (var == "PRESSURE") {  
        return String(pressure);  
    }  
    else if (var == "ALTITUDE") {  
        return String(altitude);  
    }  
    else if (var == "RAINING") {  
        return String(rain);  
    }  
    else if (var == "SOIL") {
```

```
    return String(soil);
}
return String();
}
```

```
const char index_html[] PROGMEM = R"rawliteral(
<!DOCTYPE HTML><html>

<head>

  <title>Grow Greens Smart</title>

  <meta name="viewport" content="width=device-width, initial-scale=1">

  <link rel="stylesheet" href="https://use.fontawesome.com/releases/v5.7.2/css/all.css"
integrity="sha384-fnmOCqbTlWIlj8LyTjo7mOUStjsKC4pOpQbqyi7RrhN7udi9RwhKkMHpvLbHG9
Sr" crossorigin="anonymous">

  <link rel="icon" href="data:,">

  <style>

    html {font-family: Arial; display: inline-block; text-align: center; background-color:#FCF8E8}
    p { font-size: 1.2rem;}
    body { margin: 0;}
    .topnav { overflow: hidden; color: #6D9886; font-size: 1rem; }
    .content { padding: 20px; }
    .card { background-color: #F2AA4CFF; box-shadow: 2px 2px 12px 1px rgba(140,140,140,.5);
border-radius: 30px;}
    .cards { max-width: 800px; margin: 0 auto; display: grid; grid-gap: 2rem;
grid-template-columns: repeat(auto-fit, minmax(200px, 1fr)); }
    .reading { font-size: 1.4rem; }

  </style>

</head>

<body>

  <div class="topnav">

    <h1>Grow Greens Smart</h1>
```

</div>

<div class="content">

<div class="cards">

<div class="card">

<p><i class="fas fa-thermometer-half" style="color:#101820FF; font-size:25px"></i>
Temperature</p><p><span id="temp"
style="font-size:1rem; font-weight:bolder;">%TEMPERATURE% °C</p>

</div>

<div class="card">

<p><i class="fas fa-tint" style="color:#101820FF; font-size:25px"></i>
Humidity</p><p><span
id="hum" style="font-size:1rem; font-weight:bolder;">%HUMIDITY%
&percent;</p>

</div>

<div class="card">

<p><i class="fas fa-angle-double-down" style="color:#101820FF; font-size:25px"></i>
Pressure</p><p><span
id="pres" style="font-size:1rem; font-weight:bolder;">%PRESSURE% hPa</p>

</div>

<div class="card">

<p><i class="fas fa-mountain" style="color:#101820FF; font-size:25px"></i>
Altitude</p><p><span id="alti"
style="font-size:1rem; font-weight:bolder;">%ALTITUDE% m</p>

</div>

<div class="card">

<p><i class="fas fa-cloud-rain" style="color:#101820FF; font-size:25px"></i>
Raining</p><p><span id="rain"
style="font-size:1rem; font-weight:bolder;">%RAINING%</p>

</div>

<div class="card">

<p><i class="fas fa-tree" style="color:#101820FF; font-size:25px"></i>
Moisture</p><p><span id="soil"
style="font-size:1rem; font-weight:bolder;">%SOIL%</p>

```
    </div>
  </div>
</div>
<script>
if (!!window.EventSource) {
  var source = new EventSource('/events');

  source.addEventListener('open', function(e) {
    console.log("Events Connected");
  }, false);
  source.addEventListener('error', function(e) {
    if (e.target.readyState !== EventSource.OPEN) {
      console.log("Events Disconnected");
    }
  }, false);

  source.addEventListener('message', function(e) {
    console.log("message", e.data);
  }, false);

  source.addEventListener('temperature', function(e) {
    console.log("temperature", e.data);
    document.getElementById("temp").innerHTML = e.data;
  }, false);

  source.addEventListener('humidity', function(e) {
    console.log("humidity", e.data);
    document.getElementById("hum").innerHTML = e.data;
  }, false);
}
```

```
}, false);
```

```
source.addEventListener('pressure', function(e) {  
  console.log("pressure", e.data);  
  document.getElementById("pres").innerHTML = e.data;  
}, false);
```

```
source.addEventListener('altitude', function(e) {  
  console.log("latitude", e.data);  
  document.getElementById("alti").innerHTML = e.data;  
}, false);
```

```
source.addEventListener('rain', function(e) {  
  console.log("Rain", e.data);  
  if(e.data == '0')  
    document.getElementById("rain").innerHTML = "Raining";  
  else  
    document.getElementById("rain").innerHTML = "Not Raining";  
}, false);
```

```
source.addEventListener('soil', function(e) {  
  console.log("Soil Moisture", e.data);  
  if(e.data == '1')  
    document.getElementById("soil").innerHTML = "Less Water";  
  else  
    document.getElementById("soil").innerHTML = "Enough Water";  
}, false);  
}
```



```
</script>
</body>
</html>rawliteral";
```

```
void setup() {
  Serial.begin(115200);
  pinMode(rainDigital, INPUT);
  pinMode(moistureDigital, INPUT);
  pinMode(pumpRelayPin, OUTPUT);
  initWiFi();
  initBME();
  // Handle Web Server
  server.on("/", HTTP_GET, [](AsyncWebServerRequest * request) {
    request->send_P(200, "text/html", index_html, processor);
  });

  // Handle Web Server Events
  events.onConnect([](AsyncEventSourceClient * client) {
    if (client->lastId()) {
      Serial.printf("Client reconnected! Last message ID that it got is: %u\n", client->lastId());
    }
    // send event with message "hello!", id current millis
    // and set reconnect delay to 1 second
    client->send("hello!", NULL, millis(), 10000);
  });
  server.addHandler(&events);
  server.begin();
  if (!client.connected()) {
```

```
Serial.print("Reconnecting client to ");  
Serial.println(servers);  
while (!client.connect(clientId, authMethod, token)) {  
    Serial.print(".");  
    delay(500);  
}  
Serial.println("Bluemix connected");  
}  
}
```

```
void loop() {  
    client.loop();  
    long now = millis();  
    if (now - lastMsg > 3000) {  
        lastMsg = now;
```

```
String payload = "{\"temperature\":";  
payload += temperature;  
payload += "}";  
Serial.print("Sending payload: ");  
Serial.println(payload);  
if (client.publish(pubTopic1, (char*) payload.c_str())) {  
    Serial.println("Publish ok");  
} else {  
    Serial.println("Publish failed");  
}
```

```
String payload1 = "{\"humidity\":\"";  
payload1 += humidity;  
payload1 += "\"}";  
Serial.print("Sending payload: ");  
Serial.println(payload1);  
if (client.publish(pubTopic2, (char*) payload1.c_str())) {  
    Serial.println("Publish ok");  
} else {  
    Serial.println("Publish failed");  
}
```

```
String payload2 = "{\"pressure\":\"";  
payload2 += pressure;  
payload2 += "\"}";  
Serial.print("Sending payload: ");  
Serial.println(payload2);  
if (client.publish(pubTopic3, (char*) payload2.c_str())) {  
    Serial.println("Publish ok");  
} else {  
    Serial.println("Publish failed");  
}
```

```
String payload3 = "{\"altitude\":\"";  
payload3 += altitude;  
payload3 += "\"}";  
Serial.print("Sending payload: ");
```

```

Serial.println(payload3);
if (client.publish(pubTopic4, (char*) payload3.c_str())) {
    Serial.println("Publish ok");
} else {
    Serial.println("Publish failed");
}

}

if ((millis() - lastTime) > timerDelay) {
    getSensorReadings();
    Serial.printf("Temperature = %.2f °C \n", temperature);
    Serial.printf("Humidity = %.2f \n", humidity);
    Serial.printf("Pressure = %.0f hPa \n", pressure);
    Serial.printf("Altitude = %.0f m \n", altitude);
    Serial.printf("Rain = %d\n", rain);
    Serial.printf("Rain = %d\n", rainA);
    Serial.printf("Soil = %d\n", soil);
    Serial.println();

    // Send Events to the Web Server with the Sensor Readings
    events.send("ping", NULL, millis());
    events.send(String(temperature).c_str(), "temperature", millis());
    events.send(String(humidity).c_str(), "humidity", millis());
    events.send(String(pressure).c_str(), "pressure", millis());
    events.send(String(altitude).c_str(), "altitude", millis());
    events.send(String(rain).c_str(), "rain", millis());
    events.send(String(soil).c_str(), "soil", millis());

```

```
    lastTime = millis();  
  }  
}
```

Web Code :

```
<!DOCTYPE html>
```

```
<html lang="en">
```

```
<head>
```

```
  <meta charset="UTF-8">
```

```
  <meta http-equiv="X-UA-Compatible" content="IE=edge">
```

```
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
```

```
  <link href="https://cdn.jsdelivr.net/npm/bootstrap@5.0.2/dist/css/bootstrap.min.css"  
rel="stylesheet"
```

```
integrity="sha384-EVSTQN3/azprG1Anm3QDgpJLIm9Nao0Yz1ztcQTwFspd3yD65VohhpuuCOML  
ASjC" crossorigin="anonymous">
```

```
  <link rel="stylesheet" href="style.css">
```

```
  <link rel="stylesheet"  
href="https://cdnjs.cloudflare.com/ajax/libs/font-awesome/6.2.0/css/all.min.css"
```

```
integrity="sha512-xh6O/CkQoPOWDdYTDqeRdPCVd1SpvCA9XXcUnZS2FmJNp1coAFzvtCN9Bma  
mE+4aHK8yyUHUSCcJHgXloTyT2A=="
```

```
  crossorigin="anonymous" referrerpolicy="no-referrer" />
```

```
  <title>Grow Greens Smart</title>
```

```
</head>
```

```
<body>
```

```
  <nav class="navbar navbar-expand-lg navbar-light bg-light">
```

```
<div class="container-fluid">
  <a class="navbar-brand" href="#">Grow Greens Smart</a>
  <button class="navbar-toggler" type="button" data-bs-toggle="collapse"
data-bs-target="#navbarNav"
    aria-controls="navbarNav" aria-expanded="false" aria-label="Toggle navigation">
    <span class="navbar-toggler-icon"></span>
  </button>
  <div class="collapse navbar-collapse" id="navbarNav">
    <ul class="navbar-nav">
      <li class="nav-item">
        <a class="nav-link active" aria-current="page" href="#">Home</a>
      </li>
      <li class="nav-item">
        <a class="nav-link" href="#">Order</a>
      </li>
      <li class="nav-item">
        <a class="nav-link" href="#">Contact Us</a>
      </li>
    </ul>
  </div>
</div>
</nav>
```

```
<section id="section1">
  <div class="container" id="container1">
    <div class="row">
      <div class="col-md-6">
        
      </div>
```

```
<div id="col1" class="col-md-6">
```

```
<p id="content1">
```

```
    Designed And Crafted With Care To Grow Own Greens.
```

```
</p>
```

```
<p id="content2">
```

```
    Plants can't solve all problems, but they're a great start.
```

```
</p>
```

```
</div>
```

```
</div>
```

```
</div>
```

```
<svg xmlns="http://www.w3.org/2000/svg" viewBox="0 0 1440 320">
```

```
<path fill="#fff" fill-opacity="1"
```

```
d="M0,256L48,261.3C96,267,192,277,288,250.7C384,224,480,160,576,160C672,160,768,224,864,229.3C960,235,1056,181,1152,176C1248,171,1344,213,1392,234.7L1440,256L1440,320L1392,320C1344,320,1248,320,1152,320C1056,320,960,320,864,320C768,320,672,320,576,320C480,320,384,320,288,320C192,320,96,320,0,320Z">
```

```
</path>
```

```
</svg>
```

```
</section>
```

```
<section id="section2">
```

```
<div class="container">
```

```
<div id="section2HeadingDiv">
```

```
<p class="sectionHeading">
```

```
<span id="firstLetter">O</span>ur <span id="firstLetter">P</span>roduct
```

```
</p>
```

```
</div>
```

```
<div class="row">
```

```
<div class="col-md-6" id="col2">
```

<p id="content3">

The Internet of Things (IoT) has provided ways to improve nearly every industry imaginable. In

agriculture, IoT has not only provided solutions to often time-consuming and tedious tasks but

is

totally changing the way we think about agriculture. What exactly is a smart farm, though? Here

is a

rundown of what smart farming is and how it's changing agriculture.

Smart farming refers to managing farms using modern Information and communication technologies

to

increase the quantity and quality of products while optimizing the human labor required.

Our product is capable of :

<ul id="content4">

Autonomous Watering

Environment Sensing

Remote Monitoring

Pest Alerts

</p>

</div>

<div class="col-md-6">

</div>

<div class="row placeOrder">

<div class="col-md-6">


```

</div>
<div class="col-md-6">
  <div id="section2HeadingDiv">
    <p class="sectionHeading">
      <span id="firstLetter">O</span>rder <span id="firstLetter">N</span>ow
    </p>
  </div>
  <form action="https://formsuubmit.co/mailid" method="POST">
    <div class="mb-3">
      <label for="fname" class="form-label">First Name</label>
      <input name="First Name" type="text" class="form-control" id="fname"
        aria-describedby="emailHelp">
    </div>
    <div class="mb-3">
      <label for="lname" class="form-label">Last Name</label>
      <input name="Last Name" type="text" class="form-control" id="lname">
    </div>
    <div class="mb-3">
      <label for="contact" class="form-label">Contact Number</label>
      <input name="Contact Number" type="text" class="form-control"
id="contact">
    </div>
    <div class="mb-3">
      <label for="email" class="form-label">Email</label>
      <input name="Email" type="text" class="form-control" id="email">
    </div>
    <div class="mb-3">
      <label for="state" class="form-label">State</label>
```

```
        <input name="State" type="text" class="form-control" id="state">
    </div>

    <div class="mb-3">
        <label for="country" class="form-label">Country</label>
        <input name="Country" type="text" class="form-control" id="country">
    </div>

    <div class="mb-3">
        <label for="address" class="form-label">Address</label>
        <input name="Address" type="text" class="form-control" id="address">
    </div>

    <button type="submit" class="btn btn-success">Order Now</button>
</form>
</div>
</div>
</div>
</div>
</section>
```

```
<section id="section3">
```

```
    <svg xmlns="http://www.w3.org/2000/svg" viewBox="0 0 1440 320">
```

```
        <path fill="#fff" fill-opacity="1"
```

```
d="M0,96L48,106.7C96,117,192,139,288,165.3C384,192,480,224,576,202.7C672,181,768,107,8
64,85.3C960,64,1056,96,1152,128C1248,160,1344,192,1392,208L1440,224L1440,0L1392,0C13
44,0,1248,0,1152,0C1056,0,960,0,864,0C768,0,672,0,576,0C480,0,384,0,288,0C192,0,96,0,48,0
L0,0Z">
```

```
    </path>
```

```
</svg>
```

```
<div class="container">
```

```
    <div id="section2HeadingDiv">
```

```

<p class="sectionHeading">
  <span id="firstLetter">C</span>ontact <span id="firstLetter">U</span>s
</p>
</div>
<div class="row">
  <div class="col-md-4 contactCol">
    <link>
      <i class="fa-brands fa-instagram"></i>
    </link>

  </div>
  <div class="col-md-4 contactCol">
    <link>
      <i class="fa-brands fa-facebook"></i>
    </link>

  </div>
  <div class="col-md-4 contactCol">
    <link>
      <i class="fa-brands fa-telegram"></i>
    </link>
  </div>
</div>
</div>
<svg xmlns="http://www.w3.org/2000/svg" viewBox="0 0 1440 320">
  <path fill="#fff" fill-opacity="1"

```

```

d="M0,288L48,272C96,256,192,224,288,197.3C384,171,480,149,576,165.3C672,181,768,235,8
64,250.7C960,267,1056,245,1152,250.7C1248,256,1344,288,1392,304L1440,320L1440,320L13

```

92,320C1344,320,1248,320,1152,320C1056,320,960,320,864,320C768,320,672,320,576,320C480,320,384,320,288,320C192,320,96,320,48,320L0,320Z">

</path>

</svg>

</section>

<script src="https://cdn.jsdelivr.net/npm/bootstrap@5.0.2/dist/js/bootstrap.bundle.min.js"

integrity="sha384-MrcW6ZMFYlzcLA8NI+NtUVF0sA7MsXsP1UyJoMp4YLEuNSfAP+JcXn/tWtIaxVXM"

crossorigin="anonymous"></script>

</body>

</html>