Exp. No. : 6	**Uplink and Downlink of sensor data over MQTT protocol with WDM**
Date :	

Aim:

To send the sensor data to cloud using thingzkit mini through Wifi.

Software Required:

1. Arduino IDE

Hardware Required:

1. ThingzMate Kit

Procedure:

- Open the Arduino IDE
- Enter the program as required
- Connect the Kit with the Laptop
- Run the program
- Send the commands to turn On/Off the LED through App
- Verify the Output

Program:

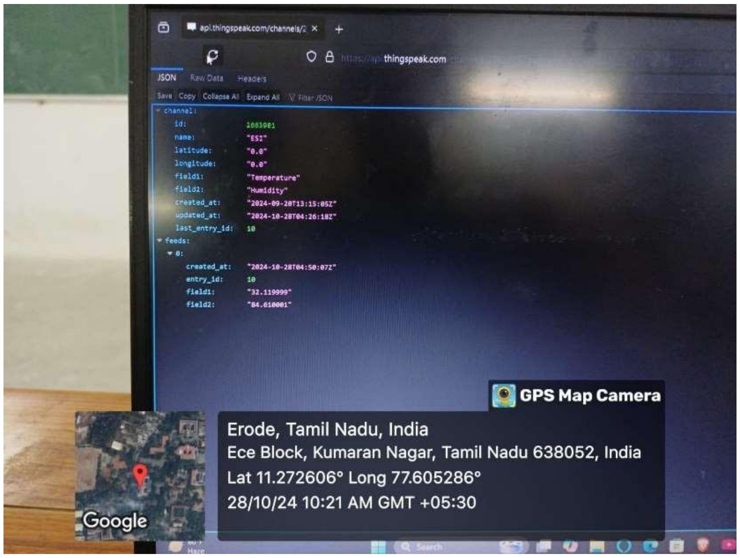
```
#include <Arduino.h>


#include <Wire.h>
#include "Adafruit_SHT31.h"


#include <WiFi.h>
#include <WiFiMulti.h>


#include <HTTPClient.h>


#define USE_SERIAL Serial


bool enableHeater = false;
uint8_t loopCnt = 0;
```

```
Adafruit_SHT31 sht31 = Adafruit_SHT31();

WiFiMulti wifiMulti;

/*
const char* ca = \
"-----BEGIN CERTIFICATE ----\n" \
"MIIEkjCCA3qgAwIBAgIQCgFBQgAAAVOFc2oLheynCDANBgkqhkiG9w0BAQsFADA/\n" \
"MSQwIgYDVQQKExtEaWdpdGFsIFNpZ25hdHVyZSBUcnVzdCBDby4xFzAVBgNVBAMT\n" \
"DkRTVCBSb290IENBIFgzMB4XDTE2MDMxNzE2NDA0NloXDTIxMDMxNzE2NDA0Nlow\n" \
"SjELMAkGA1UEBhMCVVMxFjAUBgNVBAoTDUxldCdzIEVuY3J5cHQxIzAhBgNVBAMT\n" \
"GkxldCdzIEVuY3J5cHQgQXV0aG9yaXR5IFgzMIIBIjANBgkqhkiG9w0BAQEFAAOC\n" \
"AQ8AMIIBCgKCAQEAnNMM8FrlLke3cl03g7NoYzDq1zUmGSXhvb418XCSL7e4S0EF\n" \
"q6meNQhY7LEqxGiHC6PjdeTm86dicbp5gWAf15Gan/PQeGdxyGkOlZHP/uaZ6WA8\n" \
"SMx+yk13EiSdRxta67nsHjcAHJyse6cF6s5K671B5TaYucv9bTyWaN8jKkKQDIZ0\n" \
"Z8h/pZq4UmEUEz9l6YKHy9v6Dlb2honzhT+Xhq+w3Brvaw2VFn3EK6BlspkENnWA\n" \
"a6xK8xuQSXgvopZPKiAlKQTGdMDQMc2PMTiVFrqoM7hD8bEfwzB/onkxEz0tNvjj\n" \
"/PIzark5McWvxI0NHWQWM6r6hCm21AvA2H3DkwIDAQABo4IBfTCCAXkwEgYDVR0T\n" \
"AQH/BAgwBgEB/wIBADAOBgNVHQ8BAf8EBAMCAYYwfwYIKwYBBQUHAQEEczBxMDIG\n" \
"CCsGAQUFBzABhiZodHRwOi8vaXNyZy50cnVzdGlkLm9jc3AuaWRlbnRydXN0LmNv\n" \
"bTA7BggrBgEFBQcwAoYvaHR0cDovL2FwcHMuaWRlbnRydXN0LmNvbS9yb290cy9k\n" \
"c3Ryb290Y2F4My5wN2MwHwYDVR0jBBgwFoAUxKexpHsscfrb4UuQdf/EFWCFiRAw\n" \
"VAYDVR0gBE0wSzAIBgZngQwBAgEwPwYLKwYBBAGC3xMBAQEwMDAuBggrBg
```

```
EFBQcC\n" \
"ARYiaHR0cDovL2Nwcy5yb290LXgxLmxldHNlbmNyeXB0Lm9yZzA8BgNVHR8ENTAz\n" \
"MDGgL6AthitodHRwOi8vY3JsLmlkZW50cnVzdC5jb20vRFNUUk9PVENBWDNDUkwu\n" \
"Y3JsMB0GA1UdDgQWBBSoSmpjBH3duubRObemRWXv86jsoTANBgkqhkiG9w0BAQsF\n" \
"AAOCAQEA3TPXEfNjWDjdGBX7CVW+dla5cEilaUcne8IkCJLxWh9KEik3JHRRHGJo\n" \
"uM2VcGfl96S8TihRzZvoroed6ti6WqEBmtzw3Wodatg+VyOeph4EYpr/1wXKtx8/\n"   \
"wApIvJSwtmVi4MFU5aMqrSDE6ea73Mj2tcMyo5jMd6jmeWUHK8so/joWUoHOUgwu\n" \
"X4Po1QYz+3dszkDqMp4fklxBwXRsW10KXzPMTZ+sOPAveyxindmjkW8lGy+QsRlG\n" \
"PfZ+G6Z6h7mjem0Y+iWlkYcV4PIWL1iwBi8saCbGS5jN2p8M+X+Q7UNKEkROb3N6\n" \
"KOqk/*
void setup() {


Serial.begin(9600);
while (!Serial)
    delay(10);     // will pause Zero, Leonardo, etc until serial console opens


  Serial.println("SHT31 test");
  if (! sht31.begin(0x44)) {   // Set to 0x45 for alternate i2c addr
    Serial.println("Couldn't find SHT31");
    while (1) delay(1);
  }


  USE_SERIAL.begin(115200);


  USE_SERIAL.println();
  USE_SERIAL.println();
  USE_SERIAL.println();
  for (uint8_t t = 4; t > 0; t--) {
    USE_SERIAL.printf("[SETUP] WAIT %d...\n", t);
    USE_SERIAL.flush();
    delay(1000);
  }

  wifiMulti.addAP("POCO F4", "12345678");
}

void loop() {
  // wait for WiFi connection
  char buf[300];
  if ((wifiMulti.run() == WL_CONNECTED)) {

    HTTPClient http;

    USE_SERIAL.print("[HTTP] begin...\n");
    // configure traged server and url
    //http.begin("https://www.howsmyssl.com/a/check", ca); //HTTPS

  float t = sht31.readTemperature();
  float h = sht31.readHumidity();

sprintf(buf,"https://api.thingspeak.com/update?api_key=OJOJUIAAS8D8HE98&field1=%f&field2=%f",t,h);

    http.begin(buf);  //HTTP

    USE_SERIAL.print("[HTTP] GET...\n");
    // start connection and send HTTP header
    int httpCode = http.GET();

    // httpCode will be negative on error
    if (httpCode > 0) {
      // HTTP header has been send and Server response header has been handled
      USE_SERIAL.printf("[HTTP] GET... code: %d\n", httpCode);

      // file found at server
      if (httpCode == HTTP_CODE_OK) {
        String payload = http.getString();
        USE_SERIAL.println(payload);
      }
    } else {
      USE_SERIAL.printf("[HTTP] GET... failed, error: %s\n",
http.errorToString(httpCode).c_str());
    }

    http.end();
  }

  delay(5000);
}
```

Hardware Output:

GPS Map Camera
Erode, Tamil Nadu, India
Ece Block, Kumaran Nagar, Tamil Nadu 638052, India
Lat 11.272609° Long 77.605277°
28/10/24 10:21 AM GMT +05:30
Google
LoRa Kit - 07

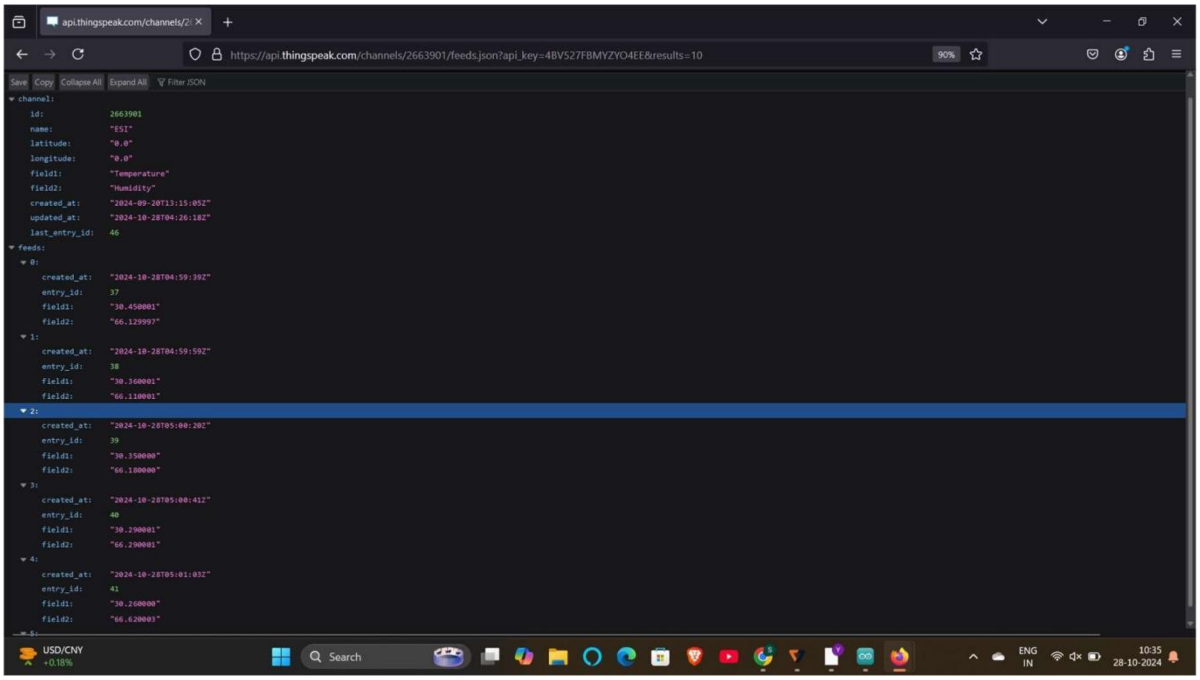


```
▾ channel:
    id:             2663901
    name:           "ESI"
    latitude:       "0.0"
    longitude:      "0.0"
    field1:         "Temperature"
    field2:         "Humidity"
    created_at:     "2024-09-20T13:15:05Z"
    updated_at:     "2024-10-28T04:26:18Z"
    last_entry_id:  10
▾ feeds:
  ▾ 0:
      created_at:   "2024-10-28T04:50:07Z"
      entry_id:     10
      field1:       "32.119999"
      field2:       "84.610001"
```

GPS Map Camera

Erode, Tamil Nadu, India
Ece Block, Kumaran Nagar, Tamil Nadu 638052, India
Lat 11.272606° Long 77.605286°
28/10/24 10:21 AM GMT +05:30

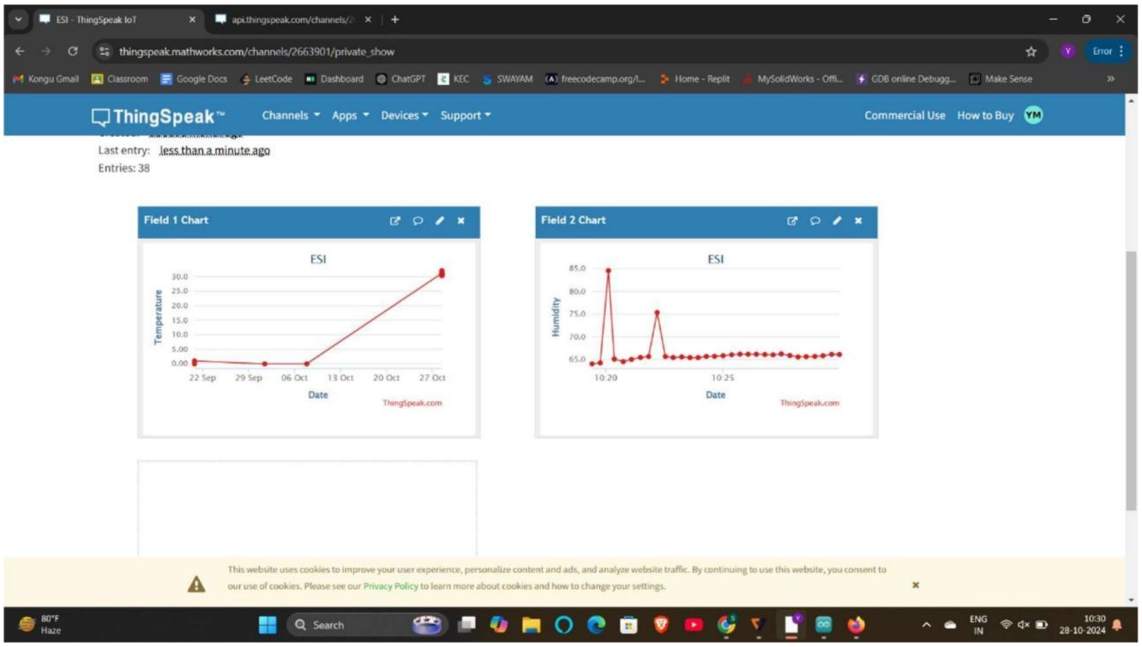
CLOUD DATA



api.thingspeak.com/channels/2
https://api.thingspeak.com/channels/2663901/feeds.json?api_key=4BV527FBMYZYO4EE&results=10
90%
Save
Copy
Collapse All
Expand All
Filter JSON
USD/CNY
+0.18%
Search
ENG
IN
10:35
28-10-2024

```
▾ channel:
    id:             2663901
    name:           "ESI"
    latitude:       "0.0"
    longitude:      "0.0"
    field1:         "Temperature"
    field2:         "Humidity"
    created_at:     "2024-09-20T13:15:05Z"
    updated_at:     "2024-10-28T04:26:18Z"
    last_entry_id:  46
▾ feeds:
  ▾ 0:
      created_at:   "2024-10-28T04:59:39Z"
      entry_id:     37
      field1:       "30.450001"
      field2:       "66.129997"
  ▾ 1:
      created_at:   "2024-10-28T04:59:59Z"
      entry_id:     38
      field1:       "30.360001"
      field2:       "66.110001"
  ▾ 2:
      created_at:   "2024-10-28T05:00:20Z"
      entry_id:     39
      field1:       "30.350000"
      field2:       "66.180000"
  ▾ 3:
      created_at:   "2024-10-28T05:00:41Z"
      entry_id:     40
      field1:       "30.290001"
      field2:       "66.290001"
  ▾ 4:
      created_at:   "2024-10-28T05:01:03Z"
      entry_id:     41
      field1:       "30.260000"
      field2:       "66.620003"
  ▾ 5:
```

Channel Output


Last entry: less than a minute ago
Entries: 38

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Video References:

Rubrics		Marks
Conduct of Experiment (20)	Analyse the problem and develop programming constructs (15)	
	Completeness of the experiment (5)	
Observation/Record (30)	Interpretation of the findings (15)	
	Simulation and Hardware (5)	
	Adherence to record submission deadline (5)	
	Presentation and completion of record (5)	
Viva (10)	Ability to recall the theoretical concepts	
Total(60)		

Result:

The uplink of sensor data to cloud was done & verified.