```
#include <WiFi.h>
#include <PubSubClient.h>
#include "DHT.h"

// ---------------- WIFI ----------------
const char* ssid = "Mobile hotspotttt";
const char* password = "srush12345";

// ---------------- MQTT (public broker) ----------------
const char* mqtt_server = "broker.hivemq.com";
int mqtt_port = 1883;

// ---------------- SENSOR PINS ----------------
#define DHTPIN 4
#define DHTTYPE DHT22
DHT dht(DHTPIN, DHTTYPE);

#define SOIL_PIN 34
#define RELAY_PIN 13

// ---------------- CAMERA IP ----------------
String cam_url = "http://10.146.203.105/capture";

WiFiClient espClient;
PubSubClient client(espClient);

// ---------------- MQTT CALLBACK ----------------
void callback(char* topic, byte* message, unsigned int length) {
  String msg = "";
  for (int i = 0; i < length; i++) msg += (char)message[i];
```

```
  if (msg == "ON") {
    digitalWrite(RELAY_PIN, LOW);   // relay ON
  } else if (msg == "OFF") {
    digitalWrite(RELAY_PIN, HIGH);  // relay OFF
  }
}

// ---------------- MQTT RECONNECT ----------------
void reconnect() {
  while (!client.connected()) {
    if (client.connect("ESP32_FARM_MAIN")) {
      client.subscribe("farm/field1/pump/command");
    } else {
      delay(2000);
    }
  }
}

// ---------------- SETUP ----------------
void setup() {
  Serial.begin(115200);
  dht.begin();

  pinMode(RELAY_PIN, OUTPUT);
  digitalWrite(RELAY_PIN, HIGH); // relay OFF initially

  WiFi.begin(ssid, password);
  while (WiFi.status() != WL_CONNECTED) delay(200);

  Serial.println("WiFi Connected!");
  Serial.print("ESP32 IP: ");
```

```
  Serial.println(WiFi.localIP());

  client.setServer(mqtt_server, mqtt_port);
  client.setCallback(callback);
}

// ---------------- MAIN LOOP ----------------
void loop() {
  if (!client.connected()) reconnect();
  client.loop();

  float T = dht.readTemperature();
  int raw = analogRead(SOIL_PIN);

  // Moisture calibration
  int dry = 3500;
  int wet = 1200;
  int moisture = map(raw, dry, wet, 0, 100);
  moisture = constrain(moisture, 0, 100);

  // -------- PUBLISH JSON WITH CAMERA URL --------
  String payload = "{";
  payload += "\"T\":" + String(T) + ",";
  payload += "\"M\":" + String(moisture) + ",";
  payload += "\"image_url\":\"" + cam_url + "\",";
  payload += "\"status\":\"OK\"";
  payload += "}";

  client.publish("farm/field1/data", payload.c_str());
  Serial.println(payload);
```

```
  delay(3000);
}
```