Smart Orthopedic Cast - Arduino Code Summary

This Arduino code runs the Smart Orthopedic Cast system, which features temperature & humidity monitoring,
battery voltage checking, OLED display feedback, and control over a micro fan, NIR LEDs, and EBS module.
The fan and therapy modules activate when the temperature crosses a threshold and deactivate when it cools down.

Modules Used:
- DHT11: Temp & humidity sensing (D2)
- OLED (I2C): Display feedback (A4/A5)
- MT3608 + Battery: Voltage measured via A0
- Fan, NIR, EBS: Controlled via D9, D10, D5

Key Features:
- Threshold-based activation (FAN/NIR/EBS)
- Battery voltage to % conversion using voltage divider
- Real-time sensor data on OLED

Code Snippet:

```
#include <DHT.h>
#include <Wire.h>
#include <Adafruit_SSD1306.h>

#define DHTPIN 2
#define FAN_PIN 9
#define NIR_PIN 10
#define EBS_PIN 5
#define BATTERY A0
#define ON_TEMP 22
#define OFF_TEMP 20

DHT dht(DHTPIN, DHT11);
Adafruit_SSD1306 display(128, 64, &Wire, -1);

void setup() {
  Serial.begin(9600);
  dht.begin();
  pinMode(FAN_PIN, OUTPUT);
  pinMode(NIR_PIN, OUTPUT);
  pinMode(EBS_PIN, OUTPUT);
  display.begin(SSD1306_SWITCHCAPVCC, 0x3C);
  display.display();
}

float getBattery() {
  int raw = analogRead(BATTERY);
  float v = raw * (5.0 / 1023.0);
  return v / (2.2 / (10.0 + 2.2));
}

void loop() {
  float t = dht.readTemperature();
  float h = dht.readHumidity();
```

```
  float bv = getBattery();
  int bp = constrain((bv - 3.0) / (4.2 - 3.0) * 100, 0, 100);
  bool state = (t >= ON_TEMP);

  digitalWrite(FAN_PIN, state);
  digitalWrite(NIR_PIN, state);
  digitalWrite(EBS_PIN, state);

  display.clearDisplay();
  display.setCursor(0, 0);
  display.printf("T: %.1f C\nH: %.1f %%\nBatt: %d%%\nFan: %s", t, h, bp, state ? "ON" : "OFF");
  display.display();

  delay(2000);
}
```