DIY Thermometer using Attiny85 Microcontroller

Components Used:

- ATtiny 85 Microcontroller
- Temperature Sensor
- LED
- 1.5V Battery(3)
- Resistor(1KΩ)

ATtiny85 Microcontroller

The **ATtiny85** is a **small, low-power 8-bit microcontroller** from the AVR family, developed by **Microchip Technology**. It is widely used in **compact and low-cost embedded systems** due to its small size and efficient performance.

Key Features:

- **8-bit RISC architecture** with AVR core
- **8 KB flash memory**, **512 bytes SRAM**, **512 bytes EEPROM**
- **5 I/O pins** (multi-functional)
- **PWM, ADC (10-bit), and I²C/SPI communication support**
- **Operates at 1.8V to 5.5V** with low power consumption

Applications:

- Miniature **sensor-based projects**
- **Wearable electronics**
- **Low-power IoT devices**
- **DIY Arduino-compatible projects**

Despite its limited I/O pins, the ATtiny85 is programmable using **Arduino IDE** via an **Arduino as ISP** or a dedicated USB programmer. Its efficiency and versatility make it ideal for simple, power-efficient applications.

Fig18.1: ATtiny85 Microcontroller

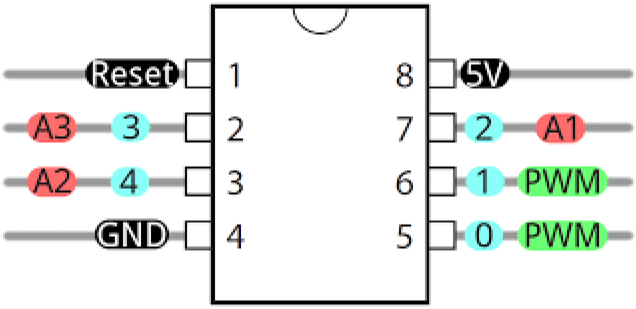

Fig18.2: Schematic Diagram of ATtiny85 Microcontroller

Project:

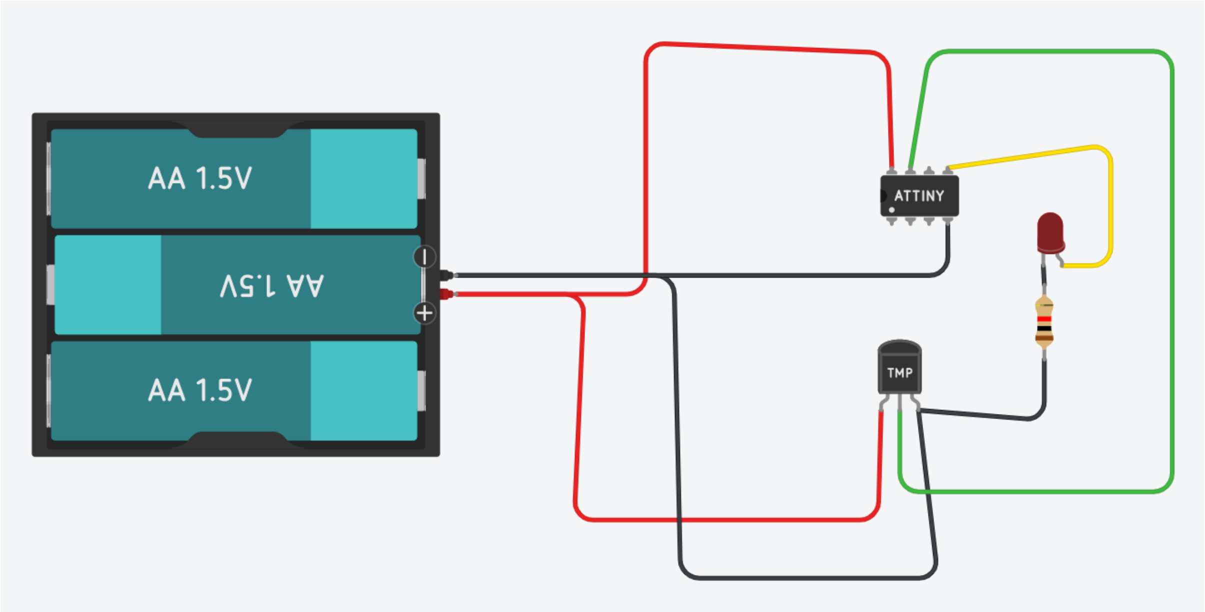

Fig18.3: DIY Thermometer using ATtiny 85

Explanation:

This project is a **compact digital thermometer** built using an **ATtiny85 microcontroller and a temperature sensor**. The system measures ambient temperature, converts it to Fahrenheit, and controls an LED based on different temperature ranges. The **small size and low power consumption** of the ATtiny85 make it ideal for **portable and embedded temperature monitoring applications**.

Principle of Operation

The temperature sensor provides an **analog voltage output** proportional to the measured temperature. The ATtiny85 reads this voltage, converts it to temperature using a **scaling formula**, and categorizes it into different ranges. Based on the detected temperature, the system **controls an LED**, blinking at different intervals to indicate specific temperature levels.

Pin Connections

- **ATtiny85**
  - **PB0 (Pin 5) → LED Output**
  - **PB2 (Pin 7) → Analog Input (Temperature Sensor Output)**
  - **VCC (Pin 8) → 5V Power Supply**
  - **GND (Pin 4) → Ground**
- **Temperature Sensor (e.g., LM35)**
  - **VCC → 5V**
  - **GND → GND**
  - **OUT → PB2 (A1)**

Signal Flow & Working

1. The **temperature sensor** outputs an analog voltage that varies linearly with temperature.
2. The **ATtiny85 reads the analog value** using analogRead(pb2).
3. The raw sensor value is converted into Fahrenheit using:

T(°F)=95×(Vsensor×100)+32T(°F) = \frac{9}{5} \times (V_{\text{sensor}} \times 100) + 32

4. The system then controls an **LED** based on the temperature range:
   - **-40°F to 68°F** → LED blinks **every 100ms**
   - **70°F to 116°F** → LED blinks **every 500ms**
   - **123°F to 238°F** → LED blinks **every 1 second**
   - **Above 238°F** → LED remains **ON continuously**

This **low-power thermometer** is ideal for **environmental monitoring, wearable temperature indicators, and compact temperature-sensitive applications**.