Interfacing TMP36 with ATtiny85

Components Required:

- ATtiny85
- TMP36
- DIP Switch
- Coil Cell
- RGB

ATtiny85:
The ATtiny85 is a small, low-power microcontroller from the AVR family, designed by Atmel (now Microchip). It features 8 KB of flash memory, 512 bytes of SRAM, and 6 I/O pins, making it suitable for small, embedded projects where size and power efficiency are crucial. It operates at a voltage of 2.7V to 5.5V and supports clock speeds up to 20 MHz. Due to its compact size and low power consumption, the ATtiny85 is often used in applications like sensors, LEDs, and simple control systems. It can be programmed using tools like Arduino IDE, though specialized programmers (e.g., USBasp) may be required.

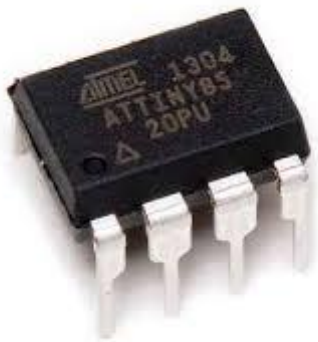

Fig22.1: ATtiny85

TMP36:
The TMP36 is a low-voltage, low-power analog temperature sensor produced by Analog Devices. It outputs a voltage that is linearly proportional to the temperature, with 0.5V corresponding to 0°C and a slope of 20mV/°C. This makes it suitable for precise temperature measurements in a wide range of applications. The TMP36 operates from a supply voltage of 2.7V to 5.5V and provides a simple interface for measuring temperature without needing complex calibration. It is often used in microcontroller-based projects for real-time temperature sensing.

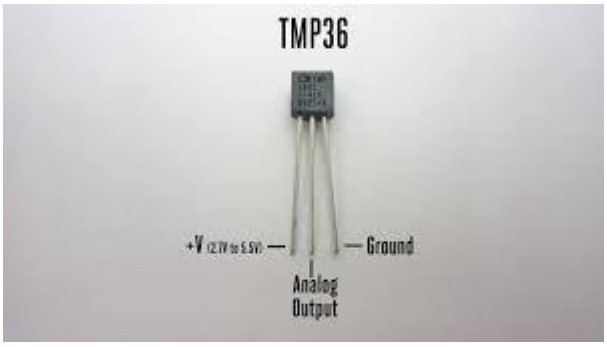

Fig22.2: TMP36

Coin Cell:

A coin cell, also known as a button cell, is a small, round, and flat battery typically used to power devices that require low power consumption and a compact form factor. These batteries are commonly found in watches, hearing aids, key fobs, small sensors, and backup power for real-time clocks in microcontrollers. Coin cells usually come in standard sizes such as CR2032, CR2025, and CR1632, with the numbers indicating the dimensions (diameter and thickness). They typically provide a nominal voltage of 3V and have a long shelf life, making them ideal for applications that need reliable power over extended periods. Despite their small size, coin cells offer relatively high energy density and are easy to replace.

Fig22.3: Coin Cell

DIP Switch:

A DIP (Dual Inline Package) switch is a set of small mechanical switches mounted in a plastic package that can be used to configure electronic devices or systems. Each switch in the package can be toggled between ON and OFF states, which correspond to binary values (1 or 0). DIP switches are commonly used for setting options like device addresses, system configurations, or operating modes in embedded systems. While they are less common in modern devices with digital interfaces, they are still used in applications where manual configuration is required and where compactness is important.

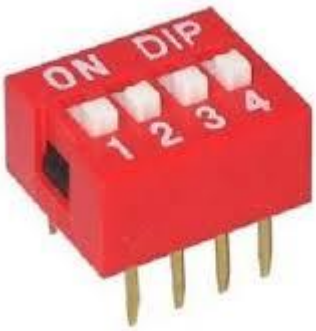

Fig22.3: DIP switch

Project:

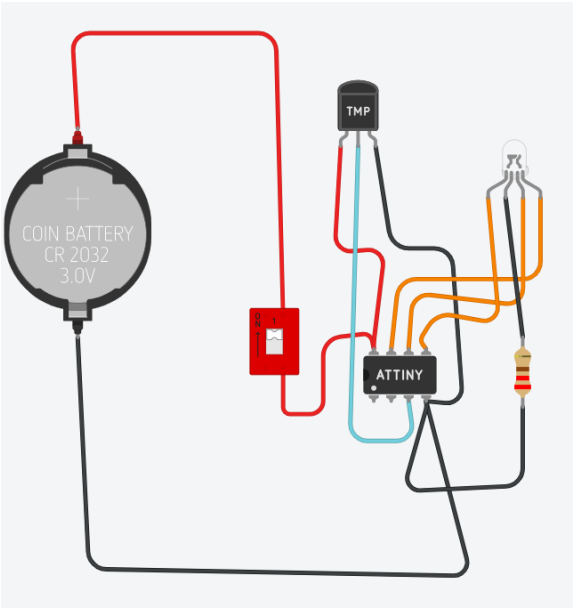

Fig22.4: Interfacing TMP36 with Attin85

Explanation:

This project uses an ATtiny85 microcontroller to read temperature data from a TMP36 temperature sensor and display the temperature on an RGB LED. The TMP36 sensor outputs an analog voltage that varies with temperature, which is then read by the ATtiny85. The voltage is converted to a temperature in Celsius using a specific formula, where the TMP36 gives 0.5V at 0°C and increases by 20mV per degree Celsius.

The project continuously monitors the temperature and, based on the value, controls the RGB LED to display different colors. For example, if the temperature is too low (below 9°C) or too high (above 35°C), the LED blinks in white or red, respectively, to indicate extreme temperatures. For temperatures within specific ranges, the LED shows colors like white, cyan, green, yellow, or red, providing a visual representation of the temperature.

The RGB LED is controlled by setting the appropriate pins of the ATtiny85 to either high or low, determining the red, green, and blue channels of the LED. The LED will blink in certain situations, such as when the temperature is at the extreme low or high ends of the scale.

This project is powered by the ATtiny85 running on 3.3V, and the TMP36 sensor's voltage-to-temperature conversion assumes this voltage reference. The microcontroller reads the temperature and changes the LED's color in real time, offering an interactive way to visualize temperature changes.