On board temperature sensor

1. Learning purpose

1. Learn how to use ADC pins on the Raspberry Pi Pico board.
2. Learn how to read the temperature of the on board temperature sensor.

2. Hardware construction

This course does not require additional hardware equipment to directly use the temperature sensor on the Raspberry Pi Pico board.

3. About code

Thonny programming

```
import machine
import utime
sensor_temp = machine.ADC(4)
conversion_factor = 3.3 / (65535)
while True:
    reading = sensor_temp.read_u16() * conversion_factor
    temperature = 27 - (reading - 0.706)/0.001721
    print(temperature)
    utime.sleep(2)
```

Program explanation:

import machine

This machine library contains the instructions needed by MicroPython to communicate with Pico and other devices.

import utime

This library handles all things related to time.

led_onboard = machine.Pin(25, machine.Pin.OUT)

The first parameter, 25, the number of pins to be set.

The second parameter, machine.Pin.OUT sets the pin mode.

sensor_temp = machine.ADC(4)

Using ADC channel 4, which is connected to the temperature sensor in the RP2040.

conversion_factor = 3.3 / (65535)

The pin level is 3.3V, and the upper limit of the conversion value is 65535, so the ratio of voltage to number is calculated according to this formula.

reading = sensor_temp.read_u16() * conversion_factor

Calculate the voltage value read by ADC.

temperature = 27 - (reading - 0.706)/0.001721

Calculate the temperature value of the built-in temperature sensor based on the voltage value.

utime.sleep(2)

Call the sleep function from the utime library, unit: s.

4. Experimental phenomenon

After the program is downloaded, we can check temperature on Thony, as shown below.