Raspberry Pi Pico-based temperature and humidity sensor

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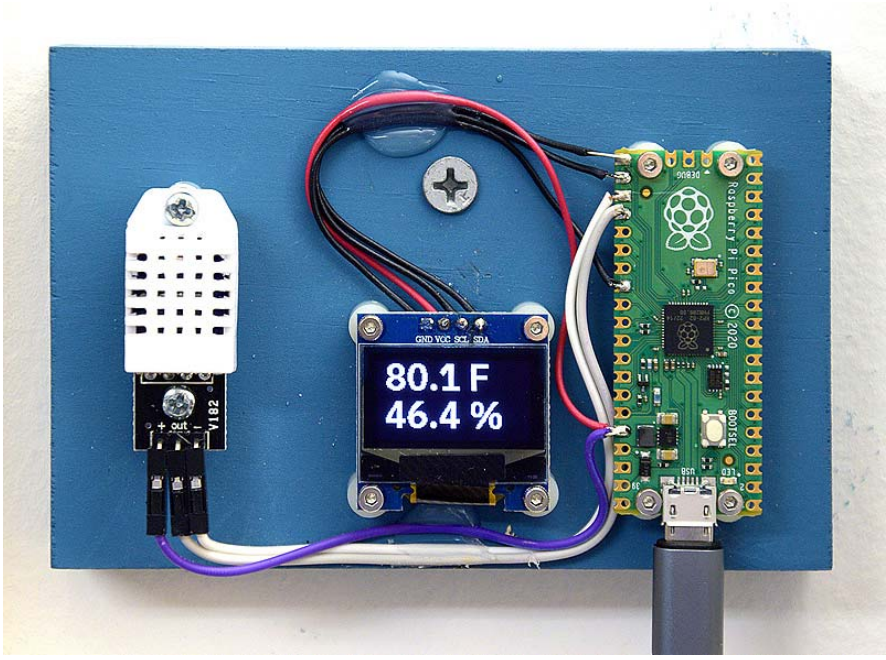
Overview

These notes describe a device that senses and displays the ambient temperature and humidity using just three components and USB power (5 V, about 20 mA). It can also report the temperature and humidity to a connected PC, which sees it as a USB serial port.



Parts

The parts required are:

- Raspberry Pi Pico microcontroller
- 128 × 64-pixel SSD1306-compatible OLED display (https://www.amazon.com/dp/B09T6SJBV5)

- DHT22 temperature and humidity sensor (https://www.amazon.com/dp/B0CPHQC9SF)

Construction

The circuit should be built so that the sensor is open to the air and not too close to the exhaust of a PC or other fan-cooled equipment. I built mine on a wooden board.

Should you choose to mount the Pico and the display with screws, note that they require 2-mm or traditional size #2 screws (which happen to be almost the same). These are smaller than usually used in electronic equipment, even if miniaturized.

A circuit diagram follows, at the end of this document.

Programming

Install Thonny on your PC and use it to install MicroPython on your Raspberry Pi Pico in the usual way. (See Getting started with Raspberry Pi Pico | Micropython | Coding projects for kids and teens.)

In Thonny, Manage Packages, install the **`ssd1306`** package. The other packages used in this project (**`time`**, **`machine`**, **`dht`**, **`select`**, **`sys`**) should already be present in MicroPython.

Place all 5 of the Python files from the "Pico programs" folder onto the Pico. They are:

`main.py`	Causes **`temp_humidity.py`** to run automatically when power is applied. You may want to omit this file while debugging.
`temp_humidity.py`	Main program.
`writer.py`	For writing text on a graphical display using fonts; from Peter Hinch (https://github.com/peterhinch/micropython-font-to-py/tree/master/writer)
`IBMPlexSans14.py`	
`IBMPlexSans30.py`	Fonts, made from IBM's free font IBM Plex Sans (https://fonts.google.com/specimen/IBM+Plex+Sans) using a utility from Peter Hinch (see his web address just given).

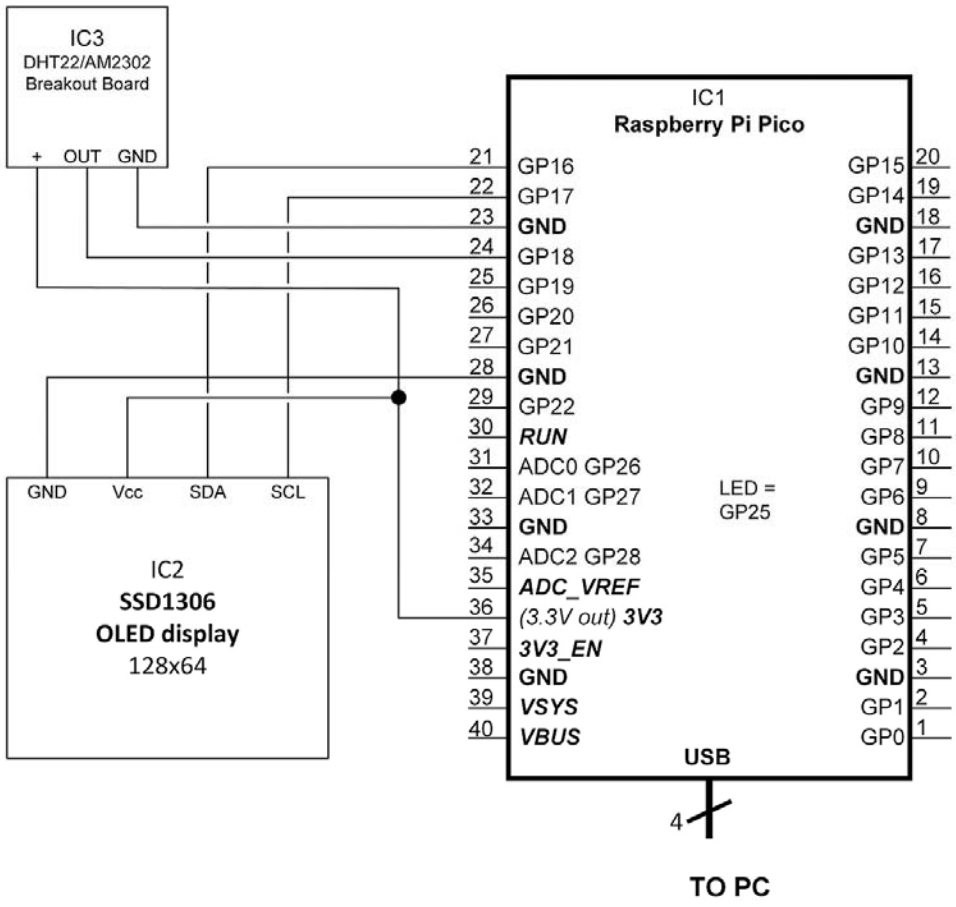
Operation

When connected to a USB port or USB power source, this device should display a series of splash screens (each lasting about 4 seconds) while the sensor initializes, and then display the current temperature and humidity, updating every 5 seconds.

If it is connected to a PC, it will be seen as a USB serial port, and sending any output to the serial port will cause it to report the temperature and humidity as text. In the "PC program" folder,

the Python program **`findAndReadTempHumidity.py`**, running on the PC, will find the Pico (without knowing its COM port number in advance) and repeatedly query and display the temperature and humidity.

Circuit diagram



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For use with temp_humidity.py (herewith)