

Final project report: Weather station

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1 The problem

Weather stations are used by meteorologist to predict the weather by using past and present weather conditions. This involves taking manual measurements once a day and logging automatically ever hour. They are usually all-in-one systems. Hobbists also build their own weather stations but again come as a single module with several separate sensors. The goal of this project is therefore to use the SensorTag to create a small, portable, wireless weather station, solving the problem of manual measurements.

2 Current Solutions

Home weather stations begin at around £100¹. They come as all in one handheld solutions², solutions with phone apps or solutions will build in screens. These solutions are expensive and sometimes cumbersome.

3 My solution

The SensorTag comes equipped with a multitude of sensors. The temperature, pressure and humidity sensors can measure the weather conditions. Then by mounting the Sensor Tag to a anemometer, wind speed can also be measured by using the accelerometers. Multiplying the angular velocity measured by the SensorTag by the arm length of the anemometer gives the wind speed. This information can be communicated over Bluetooth to the HT-Bluetooth Master/slave modem connected via UART to the KL03Z board, which displays the information on the SSD1131 OLED screen. Figure 1 shoes this solution as a block diagram.

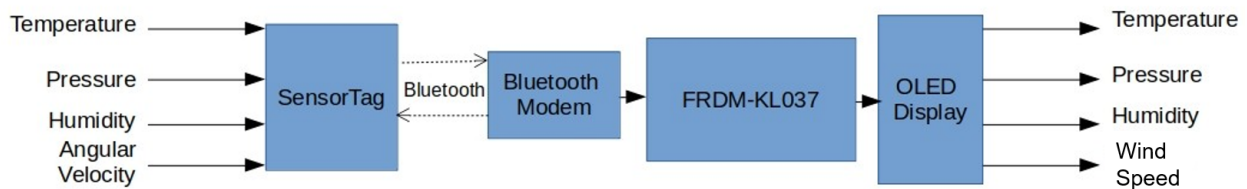


Figure 1: Block diagram of the weatherstation

4 Results

Figure 2 below show the solution I've constructed.

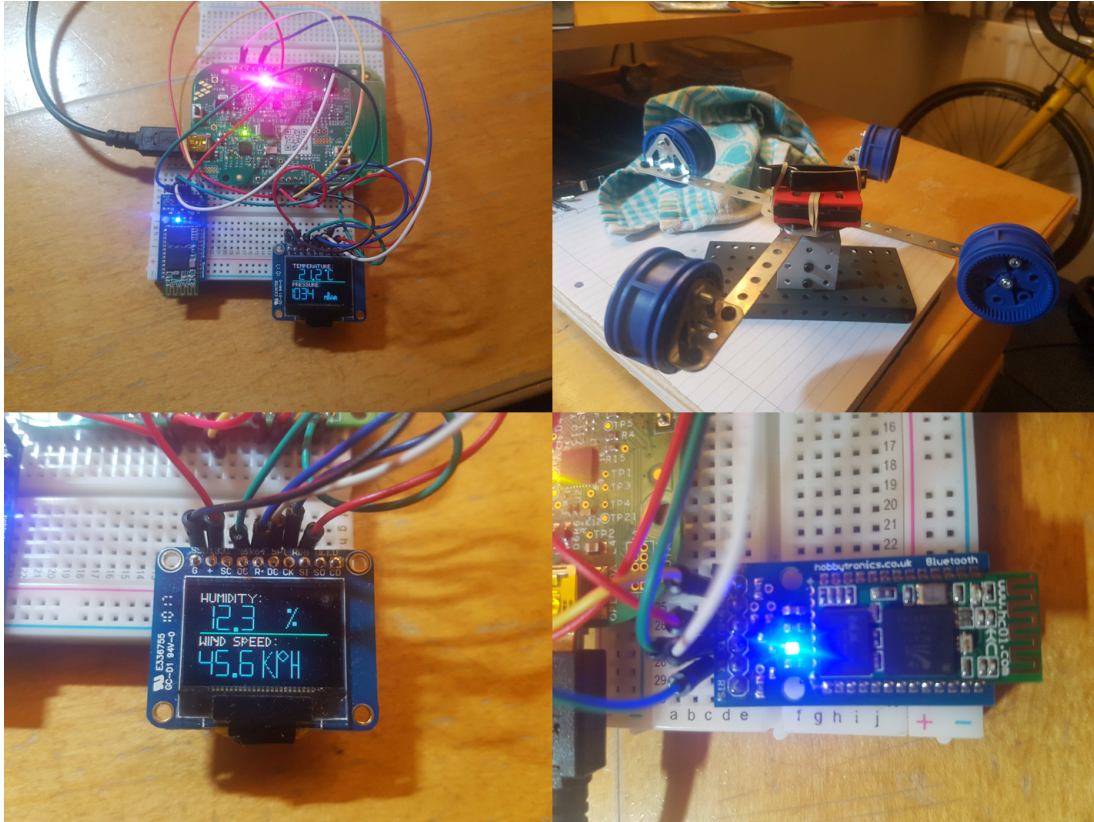


Figure 2: Top left: Overview on screen and BLE modem part. Top right: Anemometer made out of mechano with the sensor tag mounted to it. Bottom Left: Screen showing (pseudo) humidity and wind speed. Bottom right: BLE modem

I have successfully written a driver for the OLED screen that takes in the 4 measurements as strings in a specific way and then displays them on the screen. More information on how this is done is documented in the driver file `devSSD1331.c`

Unfortunately, after a lot of work I was unable to get the bluetooth module I purchased to find the sensortag. This problem consumed most of my time and realized too late so I was therefore unable to complete the proposed project. I have also failed to write a working UART driver for the BLE modem (see `BLEModem.c`) as I underestimated how complex it would be.

5 References

1. <https://the-weather-station.com/>
2. https://r-p-r.co.uk/kestrel/5500-weather-meter.php?gclid=Cj0KCQiApvbhBRDXARIsALnNoK0VL-8PV9mpQRADwvvh7pC1mzthk14RS-dVXI6kcIHzahOVQk27lBQaAskOEALw_wcB