



Example of using external sensors for logging humidity, temperature and pressure

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What is this for?

- Many instruments do not measure aerosol humidity, temperature and pressure at inlet.
- Is it of interest to measure RH/T of the room and to log it?
- Can we quantify the performance of (Nafion) aerosol dryers when in operation?

We can not present the ultimate solution, but shown one example

- An easy to build low-cost hardware
- data storage and visualisation
- integration of data into raw data from other instruments

Hardware



cutted "T"

Pressure sensor (bmp280)

USB power, programming and data cable

M5 stack microcomputer



Programming with the Arduino IDE

HYT939 RH/T sensor

Address multiplexer

grove cable

Grove cables for lengths up to 50 cm
CAT-5 twisted pair cables for distances up to 5 m

Communication
Sensors, multiplexer and M5 Stack communicate using the I2C protocol. I2C is supported by 'Arduino language',

Data flow

Read sensor data
and write data stream
to display and USB



any instrument

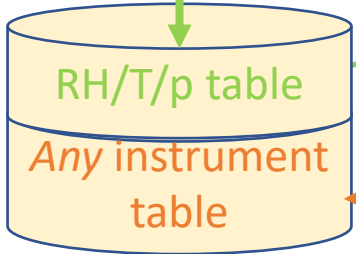
USB

Logger App
Read sensor data &
write to database

Data logger App

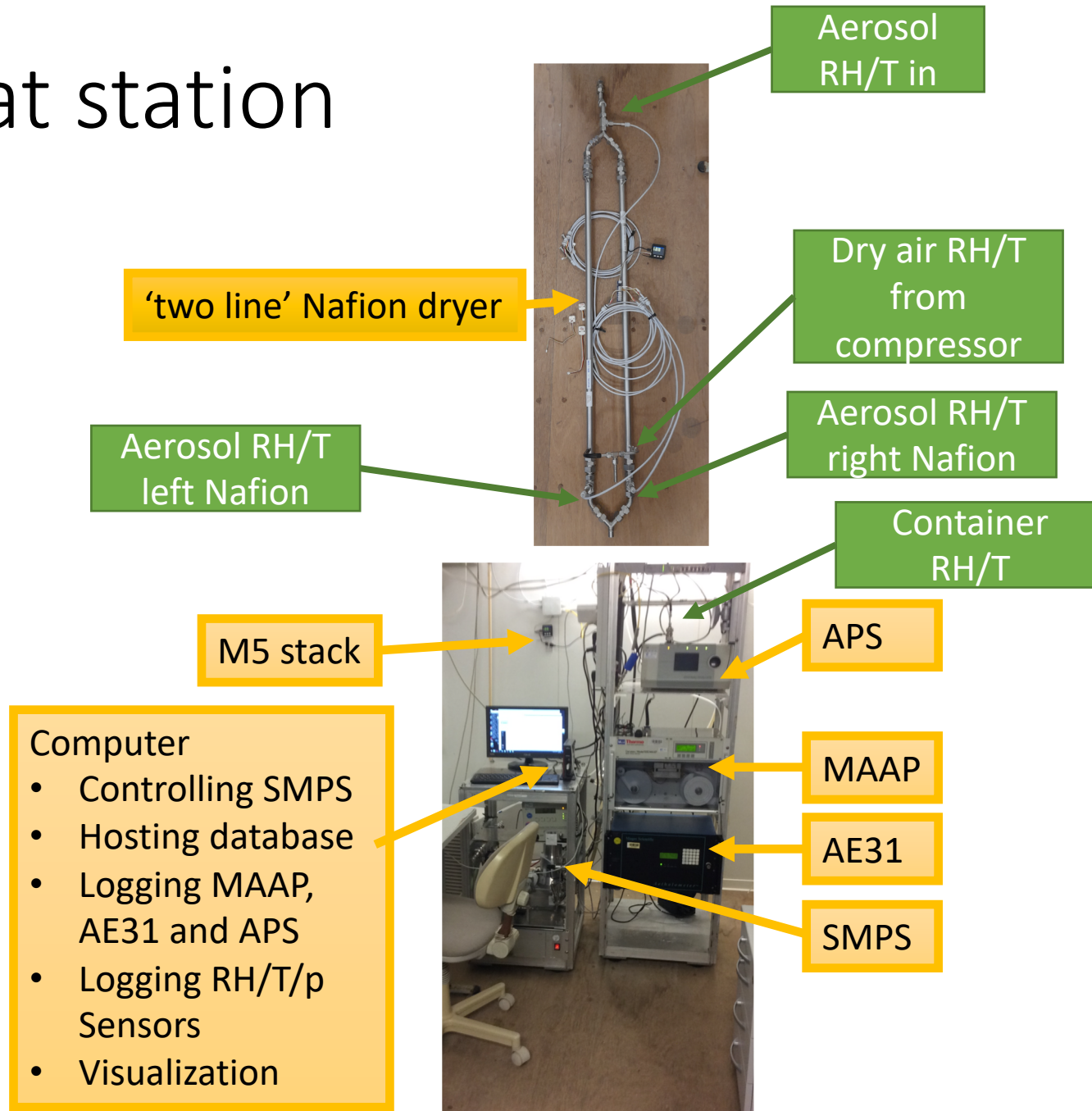
- Read data from *any instrument*
- Query RH/T/P from sensor near inlet of instrument
- Write raw data including RH/T/P

database
(influxDB)



Computer hosting data base and data loggers

Setup at station



Real time visualization of data and house keeping numbers

Problems with air conditioning !



List of components

M5Stack Core microcomputer

- <https://www.robotshop.com/de/de/m5stack-esp32-basic-core-iot-entwicklungskit.html>
- Price ~ 33.95 €

BMP280 pressure sensor

- <https://www.robotshop.com/de/de/m5stack-luftdruckeinheit-bmp280.html>
- Price ~ 6.76 €

HYT939 T/RH Sensoren

- <https://www.reichelt.de/digitaler-feuchtesensor-0--100-rf-40-125-c-to-39-hyt-939-p106000.html?CCOUNTRY=445&LANGUAGE=de>
- Price ~ 28.53 €

Grove, 8 port multiplexer

- <https://www.berrybase.de/sensoren-module/seeed-grove-system/zubehoer/seeed-grove-8-kanal-i2c-multiplexer/i2c-hub-40-tca9548a-41?iclid=1-1d487142-1387-3c11-8011-bc8713427148>
- Price ~ 6.00 €