

# Test i2c humidity sensors

## Project Goal

To create Arduino based device to compare data for as many t/RH sensors as possible (without manual sensor switch), optionally with data logging for further analysis.

- [Project Goal](#)
- [Preparation](#)
  - [Sensor i2c addresses and voltages](#)
- [Draft schematic](#)
- [Versions](#)
  - [v1](#)
  - [v2](#)
  - [v3](#)
  - [v4 - failed](#)
  - [v5](#)
  - [v6 - unstable](#)
  - [v7 - unstable](#)
  - [v8 - unstable](#)
  - [v9 - current](#)
  - [v10 - abandoned](#)
- [v10-AHT](#)
- [v1 draft multiple humidity sensors comparision](#)
- [v2 7x8 Sensors board project](#)
- [v3 7x8 Sensors board project](#)
- [v4 7x8 Sensors board project](#)
- [v5 Sensors Board project](#)
- [v6 Sensors Board](#)
- [v7 Sensors Board](#)
- [v8 Sensors Board](#)
- [v8b Sensors Board](#)
- [v9 Sensors Board](#)
- [v10-AHT Sensors Board](#)
- [v10.1-AHT Sensor board](#)

## Preparation

Use of the same sensor on i2c usually limited by 1 or 2 (using ALT i2c address) of the same type. And SHT20, SHT21, SHT25, HTU21 is actually the same type, so to be able to compare measurement there is a need to use i2c multiplexer. In the case of 8 line multiplexer, there is a possibility to have 8-16 sensor at the same time to be connected with Arduino.

## Sensor i2c addresses and voltages

to divide between multiplexers

Sensor	address	alt address	spec	Vmin-Vmax	Vtyp	1.8v	3.3v	5v**
<a href="#">AOSONG AHT10</a>	0x38 (62)	0x39 (63)	<a href="#">*pdf</a>	1.8-3.6v	3.3v	?	✓	—
<a href="#">AOSONG AHT15</a>	0x38 (62)		<a href="#">*pdf</a>	1.8-3.6v	3.3v	?	✓	—
<a href="#">Senserion SHT2x</a>	0x40 (64)	0x41 (65)	<a href="#">20,21,25</a>	2.1-3.6v	3v	—	✓	—
<a href="#">Senserion SHT3x</a>	0x44 (68)	0x45 (69)	<a href="#">SHT3x</a>	2.15-5.5v	3.3v	—	✓	✓
<a href="#">Senserion SHT8x</a>	0x44 (68)		<a href="#">SHT85</a>	2.15-5.5v	3.3v	—	✓	✓
<a href="#">Meas<sup>(1)</sup> HTU21D</a>	0x40 (64)		<a href="#">HTU21D</a>	1.5v-3.6v	3v	✓	✓	—
<a href="#">Silicon Labs Si7021</a>	0x40 (64)		<a href="#">pdf</a>	1.9v-3.6v	-	—	✓	—
<a href="#">Bosch<sup>(2)</sup> BMEx80</a>	0x76 (118)	0x77 (119)	<a href="#">680</a>	1.71v-3.6v	1.8v	✓	✓	—
<a href="#">Bosch<sup>(2)</sup> BME280</a>	0x76 (118)	0x77 (119)	<a href="#">280</a>	1.71v-3.6v	1.8v	✓	✓	—
<a href="#">Ti<sup>(3)</sup> HDC1080</a>	0x40 (64)		<a href="#">pdf</a>	2.7v-5.5v	3v	—	✓	✓

Ti <sup>(3)</sup> HDC2080	0x40 (64)	0x41 (65)	<a href="#">pdf</a>	1.62v-3.6v	-	✓	✓	✗
AOSONG DHT12	0x5C (92)		<a href="#">*pdf</a>	2.7-5.5v	5v	✗	✓	✓
AOSONG AM2320	0x5C (92)		<a href="#">*pdf</a>	3.1-5.5v	5v	✗	✗	✓

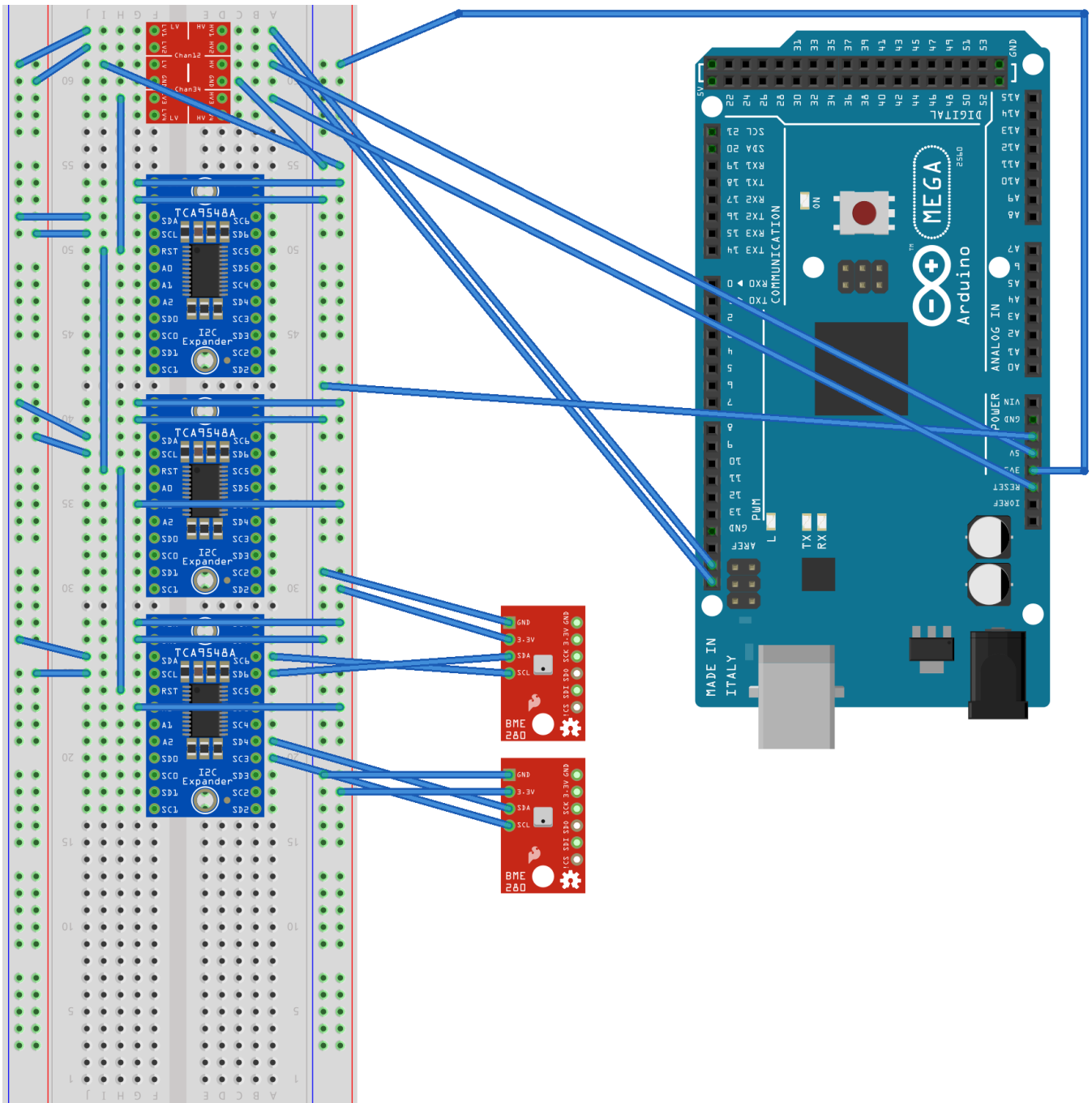
<sup>1</sup> TE Connectivity Measurement Specialties

<sup>2</sup> Bosch Sensortec

<sup>3</sup> Texas Instruments

\*\* some sensors board have voltage regulators and level converter (and may support voltages above mentioned in sensor datasheet)

## Draft schematic



fritzing

## Versions

### v1

- Single multiplexer breadboard draft project with 26 Sensors

### v2

- Use less wires and more soldering and connectors
- SD data logging (with filenames auto increment)
- Add more columns to the screen

## v3

- Use 3+ multiplexers to include twice more sensors (incl. hdc1080 and Si7021, SHT85)
- Add more SHT85 sensors to see results repeatability (for the most expensive sensor)
- remove some libraries (multiplexor, sensor reading) not compatible with multiple mux projects
- substitute i2c scan every cycle with pre-defined array processing
- (Hardware) i2c 3.3v/5v level converter
- (Hardware) 2500mAh battery with related circuits
- (Hardware) New case,
- (Hardware) New 2m wire between the main unit and the board
- (Hardware) New plastic shields for connectors

## v4 - failed

- AHT10 sensors (both wiring and code needed) - fail
- Change board wiring for new Adafruit sensors
- replace DHT12 with additional BME280
- Change board sensors (HDC1080 to HTU21d)

## v5

- New board for both mux and sensors with fewer wires and connectors
- Wire new additional 5v sensor board with mux #4
- AM2302 5v sensors and code
- HDC1080 moved to 5v additional board
- Separate AHT10 to additional multiplexor (mux #5)

## v6 - unstable

- AHT15 sensors (AHT10 code reuse)
- HDC2080 sensors and code
- connect and enable mux #6

## v7 - unstable

- hardware RTC clock
- SD files with correct timestamps

## v8 - unstable

- Updated Power circuit
- i2c voltage converter board and new wiring
- SHTC1 and SHTC3 sensors added
- mux #1 address changed (to solve i2c address conflict)
- 2x BME680 removed (to solve i2c address conflict)
- 1x BME280 removed (to solve i2c address conflict)
- DHT12 sensors added instead of three BMEx80 (8a)
- ChipCap Sensor added instead of DHT12 (8b)

## v9 - current

- [AHT20](#) instead of [AHT10](#)
- two [HIH7120](#) added (code reused from [CC2D33](#))
- 3 fan added

## v10 - abandoned

- code optimization
- trend visualization
- hardware controls
- menu options (like format SD card)

- got some kind of home-made "calibration" tests with resolutions

## v10-AHT

- New small density sensor board
- AHT10, AHT20, AHT21, AHT25 sensors only
- exclude voltage conversion (that is why AHT15 is missing)
- a single sensor on one i2c multiplexer lane
- Single read for temperature and humidity data for AHT
- simplified code to support only AHT type of sensors