

A dark green vertical bar runs down the left side of the page. A light green arrow points to the right from this bar, containing the date.

October 30, 2017

Environmental Science

Environmental Monitoring Guide:

Parameter: Humidity

University of Aruba- FHTMS

Instructors: Ms. Mettes, Mr. Sebold

Several thin, curved lines in shades of green and grey originate from the bottom left corner, extending upwards and to the right.

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About this guide

This is a guide to humidity measurement created by students of the FHTMS faculty at the University of Aruba. This guide investigates the air quality; specifically relative humidity status of the University of Aruba. The aim of the assignment is to measure and observe the possible influence of humidity on our surroundings. The instruments used to collect the data is the DHT22 sensor and the Arduino Uno Board. Results indicate that the relative humidity inside Classroom A and relative humidity outside are noticeably different due to the air-conditioning system (relative humidity rises when temperature falls).

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Introduction

What is Humidity?

Humidity is the amount of water vapor in the air. It can also be described as a hot and sticky feeling. The higher the humidity, the wetter it feels outside. Humidity is most commonly used to describe how we feel, usually paired up with heat: if it's hot and humid outside, one is most likely to feel very uncomfortable. This is because the body tries to cool itself through evaporation of moisture on the skin (sweat), but when the air is humid, the moisture becomes more difficult to evaporate and makes the cooling effect decrease.

According to Jeffrey Hovis, scientifically, “the term humidity is the amount of water vapor in the atmosphere. The vapor pressure of water measures the amount of water vapor in the air (humidity). The saturation vapor pressure is the vapor pressure when liquid water begins to condense.” (Scientific American).

Relative humidity is determined by using the actual vapor pressure divided by the saturation vapor pressure. It is expressed as the percentage of the amount needed for saturation at the same temperature. For example, if the relative humidity is 100%, the air is said to be completely saturated (which results in precipitation). If the relative humidity is 50%, the air contains half the water vapor required for it to be saturated. If the amount of water vapor in the air increases, the relative humidity increases, and if the amount of water vapor in the air decreases, the relative humidity decreases.

Relative humidity is an important metric and most commonly used in weather forecasts and reports, as it is an indicator of the likelihood of precipitation, dew, or fog. For instance- on

Aruba, the relative humidity is high, this increases the thermal environment, which in turn increases the apparent temperature of humans (as well as plants and animals) by hindering the evaporation of perspiration from the skin.

The dew-point temperature (dew) is also used by meteorologists to measure the amount of water vapor in the atmosphere. This can be described as when the atmosphere becomes saturated with water vapor. When the air reaches the dew-point temperature at a certain pressure, it can be said that the water vapor in the air is in equilibrium with liquid water, meaning water vapor is condensing at the same rate at which liquid water is evaporating.

Why is it important?

As aforementioned, Humidity is a measure of the amount of moisture in the air. It affects many properties of air (gives rise to clouds, rain, snow, dew, frost and fog), and of materials in contact with air (humans, animals, plants etc.). Humidity has a large impact on human and animal health, and the health of crops. It is important because it affects the ability of both plants and animals to cool themselves through evaporation.



Water vapor is a key agent in both weather and climate, and is an important Atmospheric Greenhouse gas. A huge variety of manufacturing, storage as well as testing processes are Humidity-critical. Humidity measurements are used wherever there is a need to prevent condensation, corrosion, mold, warping or other spoilage of products. It is important to understand this when trying to rule out why mold is growing on one patch of wall or only along the wall-ceiling joint. It is likely that the wall is cooler than the room air because there is a void in the insulation or because wind is blowing through cracks in the exterior of the building

Humidity is also highly relevant for foods (agriculture), pharmaceuticals, chemicals, fuels, wood, paper, and many other products we consume. Humidity measurements contribute primarily to achieving correct environmental conditions to sustain life.

Humidity on Aruba

The following tables illustrate the data collected by the Aruban Meteorological Department;

As seen in the figure below, the average dew-point temperature for the period 1981-2010 was usually the lowest in the months of January to March (average 22 – 22.5°C) and the highest between May and November (average 24 – 24.6°C). The yearly average dew-point temperature was 23.7°C for the period 1981 – 2010. The yearly relative humidity was 77.4% for the period

MINISTRY OF TOURISM
TRANSPORTATION AND LABOUR

DEPARTAMENTO METEOROLOGICO ARUBA **SUMMARY CLIMATOLOGICAL NORMALS, PERIOD 1981 - 2010**

Beatrix Airport Aruba (12°30'N, 70°01'W)

Element	UNIT	JAN	FEB	MRT	APR	MEI	JUN	JUL	AUG	SEP	OKT	NOV	DEC	YEAR
Air temperature	°C	26.7	26.8	27.2	27.9	28.5	28.7	28.6	29.1	29.2	28.7	28.1	27.2	28.1
Av. max. temperature	°C	30.0	30.4	30.9	31.5	32.0	32.2	32.0	32.6	32.7	32.1	31.3	30.4	31.5
Abs. max. temperature	°C	32.5	33.0	33.9	34.4	34.7	35.2	35.2	36.1	36.5	35.4	34.2	33.3	36.5
Av. min. temperature	°C	24.5	24.7	25.0	25.8	26.5	26.7	26.4	26.8	26.9	26.4	25.8	25.0	25.9
Abs. min. temperature	°C	21.3	20.6	21.4	21.9	23.2	22.8	21.6	21.3	22.1	21.9	22.0	21.4	20.6
Av. wetbulb temperature	°C	~	~	~	~	~	~	~	~	~	~	~	~	~
Av dew-point temperature	°C	22.4	22.2	22.5	23.4	24.2	24.4	24.3	24.4	24.6	24.6	24.1	23.1	23.7
Seawater temperature	°C	~	~	~	~	~	~	~	~	~	~	~	~	~
Air pressure * (+1000)	mb	13.0	12.9	12.3	11.5	11.3	12.1	12.6	11.6	10.8	10.4	10.5	12.1	11.8
Vapor pressure	mb	27.2	26.8	27.3	28.9	30.3	30.5	30.4	30.6	31.1	30.9	30.0	28.3	29.4
Relative Humidity	%	77.5	76.1	75.7	77.1	77.9	77.4	77.8	76.2	76.8	78.6	79.1	78.4	77.4
Monthly rainfall	mm	39.3	20.6	8.7	11.6	16.3	18.7	31.7	25.8	45.5	77.8	94.0	81.8	471.7
Hours with rainfall		41.8	24.1	11.1	9.2	11.8	13.5	25.4	16.5	17.3	31.6	51.3	52.6	291.0
Days with rainfall ≥ 1.0 mm		8.4	5.0	1.8	1.9	2.2	2.8	4.9	4.3	3.9	7.4	10.6	11.4	64.6
Highest rainfall in 24 hrs.	mm	47.8	43.0	59.0	35.5	78.7	62.5	78.8	34.6	196.6	101.6	126.0	71.8	196.6
Days with thunder		0.0	0.0	0.0	0.1	1.1	0.8	2.1	2.0	3.3	6.1	2.8	0.6	17.9
Cloud Coverage	%	36.8	38.0	40.7	51.7	54.1	52.0	50.3	45.9	50.3	53.4	50.4	44.2	47.3
Sunshine duration	%	~	~	~	~	~	~	~	~	~	~	~	~	~
Sunshine duration	hrs	~	~	~	~	~	~	~	~	~	~	~	~	~
Wind direction	deg													
Wind speed	m/s	7.0	7.6	7.7	7.7	8.0	8.7	8.1	7.8	6.8	5.8	5.8	6.4	7.3
Av. max windspeed	m/s	14.3	15.0	14.9	14.9	15.0	16.2	15.8	15.1	13.8	12.6	12.7	13.6	14.5
Strongest windgust	m/s	21.6	22.6	21.9	20.0	21.1	21.4	28.8	23.0	22.6	21.1	20.6	19.5	28.8
Persistence of the wind	%	~	~	~	~	~	~	~	~	~	~	~	~	~

x) 1000 mb should be added to these values

1 knot= 1.151 mph= 1.85 km/h=0.514 m/sec

~ Meaning data not Available

1981 – 2010. The relative humidity was consistent throughout the year, with the highest relative

humidity recorded was 79.1% for the month of November, and the lowest was 75.7% for the month of March.

The figure below illustrates a summary of climatological data for the year 2016. The yearly average dew-point temperature was 24.0 °C, with the lowest dew-point temperature recorded in the months of January to March (22 – 22.4°C) and the highest in the months of August and September (25.3. – 25.8°C)



METEOROLOGISCHE DIENST ARUBA

SUMMARY CLIMATOLOGICAL DATA 2017

		JAN	FEB	MRT	APR	MEI	JUN	JUL	AUG	SEP	OKT	NOV	DEC	YEAR
Air temperature	°C	26.5	27.1	27.8	28.7	29.1	29.1	29.4	29.8					
Av. max. temperature	°C	29.7	30.6	31.3	32.5	32.7	32.8	33.0	33.7					
Abs. max. temperature	°C	30.8	31.8	32.5	33.4	33.6	33.9	33.9	35.2					
Av. min. temperature	°C	24.3	24.5	25.6	26.7	27.1	27.0	27.2	27.6					
Abs. min. temperature	°C	21.8	21.8	23.4	25.7	25.7	25.3	24.7	26.2					
Av. wetbulb temperature	°C	23.5	23.4	24.2	25.2	25.9	25.9	25.7	26.1					
Av dew-point temperature	°C	22.2	21.8	22.7	23.9	24.7	24.8	24.4	24.7					
Seawater temperature	°C	27.2	26.6	26.9	~	~	~	~	~	~	~	~	~	~
Air pressure *	mb	13.6	13.4	12.9	11.4	11.8	12.1	12.6	11.4					
Vapor pressure	mb	26.8	26.1	27.7	29.6	31.2	31.3	30.5	31.2					
Relative Humidity	%	77.7	73.3	74.5	75.3	77.8	77.8	75.1	74.7					
Monthly rainfall	mm	110.8	27.2	6.4	0.0	16.4	20.4	43.0	8.8					
Hours with rainfall		50.0	19.0	13.0	0.0	2.0	14.0	16.0	6.1					
Days with rainfall ≥ 1.0 mm		11.0	3.0	3.0	0.0	1.0	4.0	4.0	3.0					
Highest rainfall in 24 hrs.	mm	21.6	19.2	3.2	0.0	15.8	11.4	15.0	4.4					
Days with thunder		0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0					
Cloud Coverage	%	50.8	46.3	63.6	66.9	69.9	64.5	63.6	62.0					
Sunshine duration	%	~	~	~	~	~	~	~	~	~	~	~	~	~
Sunshine duration	hrs	~	~	~	~	~	~	~	~	~	~	~	~	~
Wind direction	deg	082	080	081	087	089	090	088	087					
Wind speed	m/s	5.9	6.7	7.2	8.2	8.2	8.5	8.3	7.4					
Av. max windspeed	m/s	13.9	14.2	14.4	15.6	15.8	16.6	15.9	15.1					
Strongest windgust	m/s	19.5	18.0	20.6	19.5	19.5	20.1	18.0	18.5					
Persistency of the wind	%	~	~	~	~	~	~	~	~	~	~	~	~	~

x) 1000 mb should be added to these values

1 knot= 1.151 mph= 1.85 km/h=0.514 m/sec

The table on the following page represents a summary of the climatological data for 2017 (so far). It was last updated in August 2017. The lowest average dew-point temperature so far has been recorded in February (21.8°C) and the highest average dew-point temperature so far has

been recorded in June (24.8°C). The lowest recorded relative humidity was 73.3% in February and the highest relative humidity recorded so far was in May and June (77.8%).



METEOROLOGISCHE DIENST ARUBA

SUMMARY CLIMATOLOGICAL DATA 2016

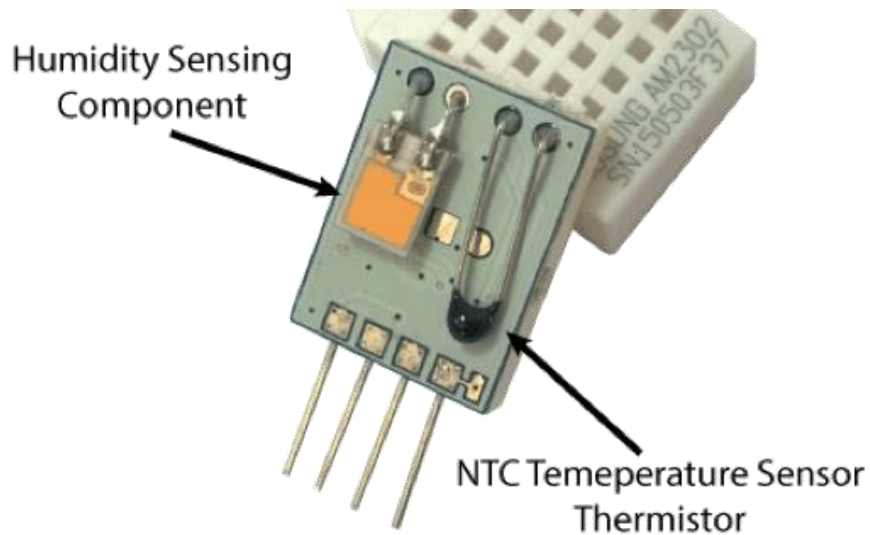
		JAN	FEB	MRT	APR	MEI	JUN	JUL	AUG	SEP	OKT	NOV	DEC	YEAR
Air temperature	°C	27.2	27.6	28.1	28.9	29.4	29.5	29.3	29.9	29.9	29.5	28.8	27.8	28.8
Av. max. temperature	°C	30.7	31.1	31.9	32.6	32.9	32.8	32.5	33.5	33.3	32.6	31.8	30.8	32.2
Abs. max. temperature	°C	31.7	31.6	32.5	33.8	35.0	34.3	33.3	35.1	34.8	34.1	33.8	32.8	35.1
Av. min. temperature	°C	25.2	25.7	26.1	26.8	27.7	27.5	27.1	27.9	27.7	27.2	26.5	25.4	26.7
Abs. min. temperature	°C	23.7	24.7	24.2	24.9	26.8	24.5	24.2	26.9	24.6	25.6	23.4	23.5	23.4
Av. wetbulb temperature	°C	22.8	22.8	23.1	24.3	24.7	24.7	24.9	26.5	26.8	26.1	25.6	24.6	24.7
Av dew-point temperature	°C	22.3	22.2	22.4	24.0	24.5	24.3	24.6	25.3	25.8	24.9	24.4	23.4	24.0
Seawater temperature	°C	~	~	~	~	~	~	~	~	~	~	~	~	~
Air pressure *	mb	12.9	12.3	13.2	10.9	11.8	13.1	12.8	11.4	11.3	9.1	9.3	12.3	11.7
Vapor pressure	mb	27.0	26.8	27.2	29.8	30.7	30.4	31.0	32.2	33.2	31.6	30.6	28.7	29.9
Relative Humidity	%	75.5	73.2	71.5	75.4	75.1	74.2	76.3	76.9	79.1	76.7	77.7	77.4	75.8
Monthly rainfall	mm	10.4	0.8	2.6	0.0	0.0	26.6	58.2	1.2	68.3	39.0	130.8	90.0	427.9
Hours with rainfall		12.0	0.0	2.0	0.0	0.0	12.0	28.0	3.0	24.0	10.0	26.0	83.0	200.0
Days with rainfall ≥ 1.0 mm		3.0	0.0	0.0	0.0	0.0	3.0	8.0	0.0	5.0	5.0	10.0	18.0	52.0
Highest rainfall in 24 hrs.	mm	5.0	0.0	0.0	0.0	0.0	19.8	17.4	0.6	32.0	29.0	70.6	14.0	70.6
Days with thunder		0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	4.0	4.0	3.0	1.0	14.0
Cloud Coverage	%	48.4	47.5	54.1	68.5	67.2	62.4	62.0	57.4	59.8	67.6	74.1	60.1	60.8
Sunshine duration	%	~	~	~	~	~	~	~	~	~	~	~	~	~
Sunshine duration	hrs	~	~	~	~	~	~	~	~	~	~	~	~	~
Wind direction	deg	082	080	075	076	083	083	101	090	088	094	105	082	087
Wind speed	m/s	7.3	8.7	8.6	7.8	8.8	9.3	8.3	8.5	7.3	5.1	3.9	6.6	7.5
Av. max windspeed	m/s	14.7	16.6	16.2	15.0	16.2	17.7	16.0	16.2	15.2	11.9	10.6	14.7	15.1
Strongest windgust	m/s	19.5	19.5	20.1	18.5	19.5	22.6	19.5	21.1	17.0	16.4	14.4	19.0	18.9
Pesistency of the wind	%	~	~	~	~	~	~	~	~	~	~	~	~	~

x) 1000 mb should be added to these values

1 knot= 1.151 mph= 1.85 km/h=0.514 m/sec

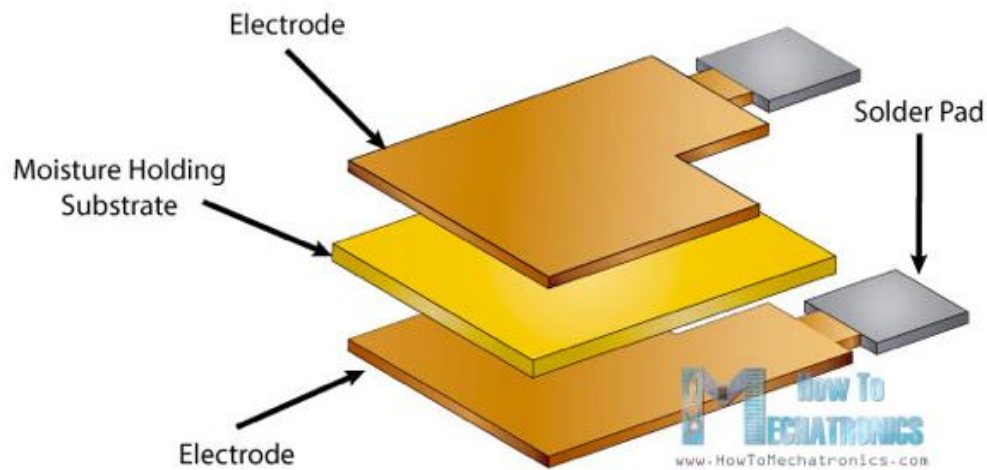
DHT22 Temperature and Humidity Sensor;

The DHT22 Temperature and humidity sensor consists of a humidity-sensing component, a Negative Temperature Coefficient (NTC) temperature sensor (or thermistor) and an Integrated circuit (IC) on the backside of the sensor.

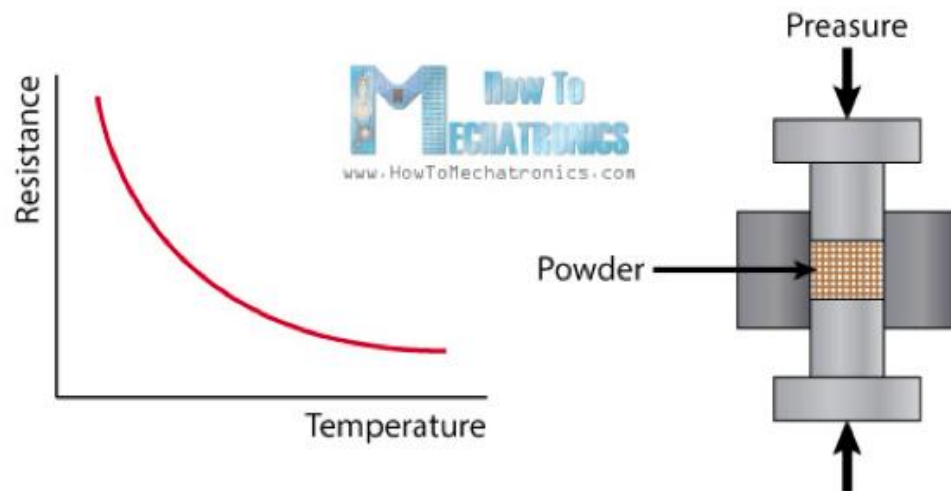


In order for us to measure the humidity at the University of Aruba, the DHT22 uses its humidity-sensing component. This component has two electrodes with moisture holding substrate between them. This is how the sensor actually works:

As the humidity changes, the conductivity; the transferring of thermal energy (heat, temperature) to something else, of the substrate changes or the resistance between these electrodes changes. This change in resistance is measured and processed by the integrated circuit, which makes it ready to be read by a microcontroller.

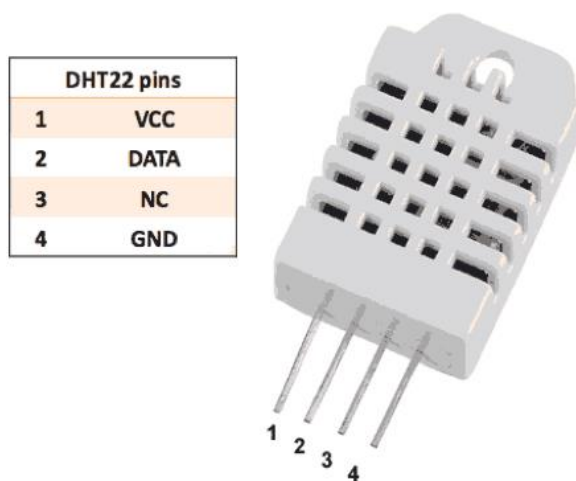


For measuring the temperature the sensor uses the NTC temperature sensor or a thermistor. A thermistor is actually a variable resistor that changes its resistance with change of the temperature. These sensors are made by the process of compacting and forming a solid mass of material by heat or pressure such as ceramics or polymers in order to provide larger changes in the resistance with just small changes in temperature. Negative Temperature Coefficient means that the resistance decreases with increase of the temperature.

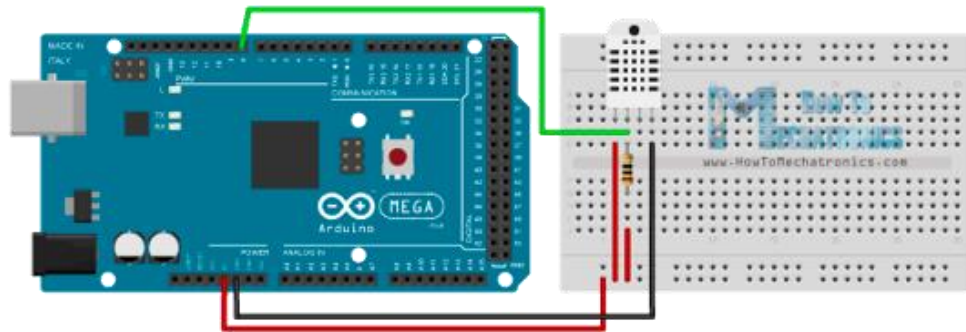


The DHT22 sensor has four pins:

1. VCC (power supply) Power's voltage should be 3.3-6V DC
2. DATA (signal) communication between MCU and AM2303
3. NC (not connected or not available)
4. GND (ground pin plugged in circuit)



“A pull-up resistor from 5K to 10K Ohms is required to keep the data line high and in order to enable the communication between the sensor and the Arduino board.” (Dejan Nedelkovski, 2017)



The DHT22 sensor has a single wire protocol in order to transfer the data.

The coding used to program the sensor is as follows;

```
// Example testing
sketch for various
DHT
humidity/temperature
sensors

// Written by ladyada, public domain

#include "DHT.h"

#define DHTPIN 2    // what digital pin we're connected to

// Uncomment whatever type you're using!
// #define DHTTYPE DHT11   // DHT 11
#define DHTTYPE DHT22   // DHT 22 (AM2302), AM2321
```

```

// #define DHTTYPE DHT21 // DHT 21 (AM2301)

// Connect pin 1 (on the left) of the sensor to +5V
// NOTE: If using a board with 3.3V logic like an Arduino Due
connect pin 1
// to 3.3V instead of 5V!
// Connect pin 2 of the sensor to whatever your DHTPIN is
// Connect pin 4 (on the right) of the sensor to GROUND
// Connect a 10K resistor from pin 2 (data) to pin 1 (power) of the
sensor

// Initialize DHT sensor.
// Note that older versions of this library took an optional third
parameter to
// tweak the timings for faster processors. This parameter is no
longer needed
// as the current DHT reading algorithm adjusts itself to work on
faster procs.
DHT dht(DHTPIN, DHTTYPE);

void setup() {
  Serial.begin(9600);
  Serial.println("DHT22 test!");

  dht.begin();
}

void loop() {
  // Wait a few seconds between measurements.
  delay(2000);

  // Reading temperature or humidity takes about 250 milliseconds!
  // Sensor readings may also be up to 2 seconds 'old' (its a very
slow sensor)
  float h = dht.readHumidity();
  // Read temperature as Celsius (the default)
  float t = dht.readTemperature();

```

```

// Read temperature as Fahrenheit (isFahrenheit = true)
float f = dht.readTemperature(true);

// Check if any reads failed and exit early (to try again).
if (isnan(h) || isnan(t) || isnan(f)) {
    Serial.println("Failed to read from DHT sensor!");
    return;
}

// Compute heat index in Fahrenheit (the default)
float hif = dht.computeHeatIndex(f, h);
// Compute heat index in Celsius (isFahreheit = false)
float hic = dht.computeHeatIndex(t, h, false);

Serial.print("Humidity: ");
Serial.print(h);
Serial.print(" %\t");
Serial.print("Temperature: ");
Serial.print(t);
Serial.print(" *C ");
Serial.print(f);
Serial.print(" *F\t");
Serial.print("Heat index: ");
Serial.print(hic);
Serial.print(" *C ");
Serial.print(hif);
Serial.println(" *F");
}

```

(Sevold, 2017)

EPA Standard Values

According to the EPA, no standard values were found- however the standard values for humidity indoors according to their 'Building Air Quality Guide' are; temperature range above 40°F and below 100° with a relative humidity (rh) of at least 40%.

It also states that if a unit of air contains half of the water vapor it can hold, it is said to be at 50% relative humidity (RH). As the air cools, the relative humidity increases. If the air contains all of the water vapor it can hold, it is at 100% RH, and the water vapor condenses, changing from a gas to a liquid. It is possible to reach 100% RH without changing the amount of water vapor in the air (its "vapor pressure" or "absolute humidity"); all that is required is for the air temperature to drop to the "dew point." Relative humidity and temperature often vary within a room, while the absolute humidity in the room air can usually be assumed to be uniform. Therefore, if one side of the room is warm and the other side cool, the cool side of the room has a higher RH than the warm side. The highest RH in a room is always next to the coldest surface. This is referred as the "first condensing surface," as it will be the location where condensation first occurs, if the relative humidity at the surface reaches 100%.

Measurements

Fieldwork at University of Aruba;

The humidity was measured on 23/10/2017 at approximately 11:30 A.M in classroom A. As can be seen in the measurements below, there is a noticeable difference in the average measurements, evidently because the temperature and humidity in class and outside of the class are very different. This observation has been done taking in to account that the air-conditioning was on at 23 degrees in classroom A. Running an air-conditioning system can also help internal humidity levels drop, air from the device circulating throughout the chosen area, decreasing moisture present in it as the air is cooled and shifted drying it as such. In classroom A the average relative humidity was recorded at 63.30%, which indicates that it is at a satisfactory indoor air quality.

Humidity: 62.90 %	Temperature: 24.30 °C 75.74 °F	Heat index: 24.43 °C 75.97 °F	/ */ average temp: 24.21 average humidity: 63.50
Humidity: 62.70 %	Temperature: 24.20 °C 75.56 °F	Heat index: 24.31 °C 75.76 °F	/ */ average temp: 24.21 average humidity: 63.47
Humidity: 62.80 %	Temperature: 24.30 °C 75.74 °F	Heat index: 24.43 °C 75.97 °F	/ */ average temp: 24.21 average humidity: 63.45
Humidity: 62.70 %	Temperature: 24.30 °C 75.74 °F	Heat index: 24.42 °C 75.96 °F	/ */ average temp: 24.21 average humidity: 63.42
Humidity: 62.60 %	Temperature: 24.30 °C 75.74 °F	Heat index: 24.42 °C 75.96 °F	/ */ average temp: 24.22 average humidity: 63.40
Humidity: 62.50 %	Temperature: 24.20 °C 75.56 °F	Heat index: 24.31 °C 75.75 °F	/ */ average temp: 24.22 average humidity: 63.37
Humidity: 62.40 %	Temperature: 24.30 °C 75.74 °F	Heat index: 24.41 °C 75.95 °F	/ */ average temp: 24.22 average humidity: 63.34
Humidity: 62.30 %	Temperature: 24.30 °C 75.74 °F	Heat index: 24.41 °C 75.94 °F	/ */ average temp: 24.22 average humidity: 63.31
Humidity: 62.20 %	Temperature: 24.30 °C 75.74 °F	Heat index: 24.41 °C 75.94 °F	/ */ average temp: 24.22 average humidity: 63.28
Humidity: 63.80 %	Temperature: 24.30 °C 75.74 °F	Heat index: 24.45 °C 76.01 °F	/ */ average temp: 24.23 average humidity: 63.29
Humidity: 63.50 %	Temperature: 24.30 °C 75.74 °F	Heat index: 24.44 °C 76.00 °F	/ */ average temp: 24.23 average humidity: 63.30
Humidity: 63.30 %	Temperature: 24.30 °C 75.74 °F	Heat index: 24.44 °C 75.99 °F	/ */ average temp: 24.23 average humidity: 63.30
Humidity: 63.10 %	Temperature: 24.30 °C 75.74 °F	Heat index: 24.43 °C 75.98 °F	/ */ average temp: 24.23 average humidity: 63.29
Humidity: 62.90 %	Temperature: 24.20 °C 75.56 °F	Heat index: 24.32 °C 75.77 °F	/ */ average temp: 24.23 average humidity: 63.28
Humidity: 62.80 %	Temperature: 24.30 °C 75.74 °F	Heat index: 24.43 °C 75.97 °F	/ */ average temp: 24.23 average humidity: 63.27
Humidity: 62.60 %	Temperature: 24.30 °C 75.74 °F	Heat index: 24.42 °C 75.96 °F	/ */ average temp: 24.23 average humidity: 63.25
Humidity: 62.40 %	Temperature: 24.30 °C 75.74 °F	Heat index: 24.41 °C 75.95 °F	/ */ average temp: 24.23 average humidity: 63.23
Humidity: 62.30 %	Temperature: 24.30 °C 75.74 °F	Heat index: 24.41 °C 75.94 °F	/ */ average temp: 24.24 average humidity: 63.21
Humidity: 62.20 %	Temperature: 24.30 °C 75.74 °F	Heat index: 24.41 °C 75.94 °F	/ */ average temp: 24.24 average humidity: 63.19
Humidity: 62.10 %	Temperature: 24.30 °C 75.74 °F	Heat index: 24.41 °C 75.93 °F	/ */ average temp: 24.24 average humidity: 63.17
Humidity: 61.70 %	Temperature: 24.30 °C 75.74 °F	Heat index: 24.40 °C 75.91 °F	/ */ average temp: 24.24 average humidity: 63.14
Humidity: 61.40 %	Temperature: 24.30 °C 75.74 °F	Heat index: 24.39 °C 75.90 °F	/ */ average temp: 24.24 average humidity: 63.10
Humidity: 61.30 %	Temperature: 24.30 °C 75.74 °F	Heat index: 24.39 °C 75.90 °F	/ */ average temp: 24.24 average humidity: 63.06
Humidity: 61.20 %	Temperature: 24.20 °C 75.56 °F	Heat index: 24.27 °C 75.69 °F	/ */ average temp: 24.24 average humidity: 63.03
Humidity: 61.10 %	Temperature: 24.20 °C 75.56 °F	Heat index: 24.27 °C 75.69 °F	/ */ average temp: 24.24 average humidity: 62.99
Humidity: 61.20 %	Temperature: 24.30 °C 75.74 °F	Heat index: 24.38 °C 75.89 °F	/ */ average temp: 24.24 average humidity: 62.92
Humidity: 61.70 %	Temperature: 24.20 °C 75.56 °F	Heat index: 24.29 °C 75.72 °F	/ */ average temp: 24.24 average humidity: 62.90
Humidity: 61.80 %	Temperature: 24.20 °C 75.56 °F	Heat index: 24.29 °C 75.72 °F	/ */ average temp: 24.24 average humidity: 62.88
Humidity: 61.80 %	Temperature: 24.20 °C 75.56 °F	Heat index: 24.29 °C 75.72 °F	/ */ average temp: 24.24 average humidity: 62.86
Humidity: 62.00 %	Temperature: 24.20 °C 75.56 °F	Heat index: 24.29 °C 75.73 °F	/ */ average temp: 24.24 average humidity: 62.84
Humidity: 62.20 %	Temperature: 24.20 °C 75.56 °F	Heat index: 24.30 °C 75.74 °F	/ */ average temp: 24.24 average humidity: 62.83
Humidity: 62.20 %	Temperature: 24.20 °C 75.56 °F	Heat index: 24.30 °C 75.74 °F	/ */ average temp: 24.24 average humidity: 62.82
Humidity: 61.90 %	Temperature: 24.20 °C 75.56 °F	Heat index: 24.29 °C 75.73 °F	/ */ average temp: 24.24 average humidity: 62.81
Humidity: 61.90 %	Temperature: 24.20 °C 75.56 °F	Heat index: 24.29 °C 75.73 °F	/ */ average temp: 24.24 average humidity: 62.79
Humidity: 61.70 %	Temperature: 24.20 °C 75.56 °F	Heat index: 24.29 °C 75.72 °F	/ */ average temp: 24.24 average humidity: 62.77

The second recording was done outside of the classroom under the gazebo. The sensor was on for approximately 5 minutes at 1:30 P.M. and the average temperature measured was 75.02% rh. Which is evidently higher than the previous recording. This higher humidity and high temperature indicates that the air quality outside was not satisfactory.

Humidity: 73.00 %	Temperature: 29.80 *C 85.64 *F	Heat index: 35.26 *C 95.48 *F	/* average temp: 28.95 average humidity: 78.43
Humidity: 72.80 %	Temperature: 29.70 *C 85.46 *F	Heat index: 34.96 *C 94.93 *F	/* average temp: 28.97 average humidity: 78.27
Humidity: 72.60 %	Temperature: 29.80 *C 85.64 *F	Heat index: 35.17 *C 95.30 *F	/* average temp: 28.99 average humidity: 78.11
Humidity: 72.60 %	Temperature: 29.80 *C 85.64 *F	Heat index: 35.17 *C 95.30 *F	/* average temp: 29.01 average humidity: 77.96
Humidity: 72.60 %	Temperature: 29.90 *C 85.82 *F	Heat index: 35.42 *C 95.76 *F	/* average temp: 29.04 average humidity: 77.82
Humidity: 72.60 %	Temperature: 29.80 *C 85.64 *F	Heat index: 35.17 *C 95.30 *F	/* average temp: 29.06 average humidity: 77.69
Humidity: 72.70 %	Temperature: 29.90 *C 85.82 *F	Heat index: 35.45 *C 95.81 *F	/* average temp: 29.08 average humidity: 77.57
Humidity: 72.70 %	Temperature: 29.90 *C 85.82 *F	Heat index: 35.45 *C 95.81 *F	/* average temp: 29.10 average humidity: 77.45
Humidity: 72.70 %	Temperature: 29.90 *C 85.82 *F	Heat index: 35.45 *C 95.81 *F	/* average temp: 29.12 average humidity: 77.33
Humidity: 73.20 %	Temperature: 30.00 *C 86.00 *F	Heat index: 35.83 *C 96.50 *F	/* average temp: 29.14 average humidity: 77.24
Humidity: 73.10 %	Temperature: 30.00 *C 86.00 *F	Heat index: 35.81 *C 96.45 *F	/* average temp: 29.16 average humidity: 77.14
Humidity: 73.00 %	Temperature: 30.00 *C 86.00 *F	Heat index: 35.78 *C 96.41 *F	/* average temp: 29.18 average humidity: 77.05
Humidity: 72.90 %	Temperature: 30.00 *C 86.00 *F	Heat index: 35.76 *C 96.36 *F	/* average temp: 29.19 average humidity: 76.96
Humidity: 72.70 %	Temperature: 30.00 *C 86.00 *F	Heat index: 35.71 *C 96.27 *F	/* average temp: 29.21 average humidity: 76.87
Humidity: 72.60 %	Temperature: 30.10 *C 86.18 *F	Heat index: 35.94 *C 96.69 *F	/* average temp: 29.23 average humidity: 76.78
Humidity: 72.50 %	Temperature: 30.20 *C 86.36 *F	Heat index: 36.18 *C 97.12 *F	/* average temp: 29.25 average humidity: 76.69
Humidity: 72.30 %	Temperature: 30.10 *C 86.18 *F	Heat index: 35.86 *C 96.55 *F	/* average temp: 29.27 average humidity: 76.61
Humidity: 72.30 %	Temperature: 30.20 *C 86.36 *F	Heat index: 36.12 *C 97.02 *F	/* average temp: 29.28 average humidity: 76.52
Humidity: 72.10 %	Temperature: 30.10 *C 86.18 *F	Heat index: 35.81 *C 96.46 *F	/* average temp: 29.30 average humidity: 76.44
Humidity: 72.00 %	Temperature: 30.10 *C 86.18 *F	Heat index: 35.79 *C 96.42 *F	/* average temp: 29.32 average humidity: 76.35
Humidity: 72.00 %	Temperature: 30.20 *C 86.36 *F	Heat index: 36.05 *C 96.88 *F	/* average temp: 29.33 average humidity: 76.27
Humidity: 71.80 %	Temperature: 30.20 *C 86.36 *F	Heat index: 35.99 *C 96.79 *F	/* average temp: 29.35 average humidity: 76.19
Humidity: 71.50 %	Temperature: 30.20 *C 86.36 *F	Heat index: 35.91 *C 96.65 *F	/* average temp: 29.36 average humidity: 76.11
Humidity: 71.20 %	Temperature: 30.20 *C 86.36 *F	Heat index: 35.84 *C 96.51 *F	/* average temp: 29.38 average humidity: 76.02
Humidity: 71.00 %	Temperature: 30.30 *C 86.54 *F	Heat index: 36.04 *C 96.87 *F	/* average temp: 29.39 average humidity: 75.93
Humidity: 70.80 %	Temperature: 30.30 *C 86.54 *F	Heat index: 35.99 *C 96.78 *F	/* average temp: 29.41 average humidity: 75.85
Humidity: 70.70 %	Temperature: 30.30 *C 86.54 *F	Heat index: 35.96 *C 96.73 *F	/* average temp: 29.42 average humidity: 75.76
Humidity: 70.60 %	Temperature: 30.30 *C 86.54 *F	Heat index: 35.94 *C 96.69 *F	/* average temp: 29.44 average humidity: 75.68
Humidity: 70.40 %	Temperature: 30.30 *C 86.54 *F	Heat index: 35.88 *C 96.59 *F	/* average temp: 29.45 average humidity: 75.59
Humidity: 70.30 %	Temperature: 30.30 *C 86.54 *F	Heat index: 35.86 *C 96.54 *F	/* average temp: 29.47 average humidity: 75.51
Humidity: 70.10 %	Temperature: 30.40 *C 86.72 *F	Heat index: 36.06 *C 96.91 *F	/* average temp: 29.48 average humidity: 75.42
Humidity: 70.00 %	Temperature: 30.40 *C 86.72 *F	Heat index: 36.03 *C 96.86 *F	/* average temp: 29.49 average humidity: 75.34
Humidity: 70.00 %	Temperature: 30.50 *C 86.90 *F	Heat index: 36.29 *C 97.32 *F	/* average temp: 29.51 average humidity: 75.26
Humidity: 70.00 %	Temperature: 30.50 *C 86.90 *F	Heat index: 36.29 *C 97.32 *F	/* average temp: 29.52 average humidity: 75.18
Humidity: 69.60 %	Temperature: 30.50 *C 86.90 *F	Heat index: 36.18 *C 97.12 *F	/* average temp: 29.54 average humidity: 75.10
Humidity: 69.50 %	Temperature: 30.50 *C 86.90 *F	Heat index: 36.15 *C 97.07 *F	/* average temp: 29.55 average humidity: 75.02

Air temperature is a key measurement alongside relative humidity. This is because the “relative” aspect is effectively “relative to temperature”. For a given air sample, a rise in temperature means a fall in relative humidity. For example, at a humidity of 50 % rh, a temperature rise from 20 °C to 21 °C will cause relative humidity to fall by about 3 % rh. (Bell, 2011)

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Ledger

Pictured below is the DHT22 sensor and the Arduino Uno Board which was used to measure the Humidity at the University of Aruba.

