***Environmental Monitoring Guide***

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***Precision Temperature***

We were measuring a precision temperature today with the Air Sensor *MCP9808.*

Why is it important to measure temperature?

It is important to measure the temperature because it is one of the major influences of climate change. It affects the entire ecosystem and the biodiversity drastically. It is a determining factor for climate change thus it is a major concern for the conservation and preservation of our dushi Aruba and our awesome world. Measuring the temperature helps us to keep track of the changes and alterations that occur.It gives us a sense of understanding of our surrounding and our current climate. And it helps us to be proactive and preventive against substantial and eventual repercussions.

Precision Temperature Sensor *MCP9808.*

The MCP9808 digital temperature sensor converts temperatures between -20°C and +100°C to a digital word with ±0.5°C (max.) accuracy. It works great with any microcontroller using standard i2c. There are 3 address pins so you can connect up to 8 to a single I2C bus without address collisions. A wide voltage range makes is usable with 2.7V to 5.5V. This small sensor comes on a breakout board PCB for easy use. The PCB includes mounting holes, and pull down resistors for the 3 address pins. (<https://www.adafruit.com/product/1782> ) In order for sensor to measure we had an Arduino program set up on the computer. After the sensor was connected to the computer through USB port some settings were changed: the board was set on “Arduino Nano” and the port to a port through which the sensor was connected. Finally when Serial Monitor button was clicked we started getting the data.

The code used to program the sensor:

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| /\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/  /\*!  @file Adafruit\_MCP9808.h  @author K. Townsend (Adafruit Industries)  @license BSD (see license.txt)  This is a library for the Adafruit MCP9808 Temp Sensor breakout board  ----><http://www.adafruit.com/products/1782>  Adafruit invests time and resources providing this open source code,  please support Adafruit and open-source hardware by purchasing  products from Adafruit!  @section HISTORY  v1.0 - First reléase  \*/  /\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/  #ifndef \_ADAFRUIT\_MCP9808\_H  #define \_ADAFRUIT\_MCP9808\_H  #if ARDUINO >= 100  #include "Arduino.h"  #else  #include "WProgram.h"  #endif  #include <Wire.h>  #define MCP9808\_I2CADDR\_DEFAULT 0x18  #define MCP9808\_REG\_CONFIG 0x01  #define MCP9808\_REG\_CONFIG\_SHUTDOWN 0x0100  #define MCP9808\_REG\_CONFIG\_CRITLOCKED 0x0080  #define MCP9808\_REG\_CONFIG\_WINLOCKED 0x0040  #define MCP9808\_REG\_CONFIG\_INTCLR 0x0020  #define MCP9808\_REG\_CONFIG\_ALERTSTAT 0x0010  #define MCP9808\_REG\_CONFIG\_ALERTCTRL 0x0008  #define MCP9808\_REG\_CONFIG\_ALERTSEL 0x0004  #define MCP9808\_REG\_CONFIG\_ALERTPOL 0x0002  #define MCP9808\_REG\_CONFIG\_ALERTMODE 0x0001  #define MCP9808\_REG\_UPPER\_TEMP 0x02  #define MCP9808\_REG\_LOWER\_TEMP 0x03  #define MCP9808\_REG\_CRIT\_TEMP 0x04  #define MCP9808\_REG\_AMBIENT\_TEMP 0x05  #define MCP9808\_REG\_MANUF\_ID 0x06  #define MCP9808\_REG\_DEVICE\_ID 0x07  class Adafruit\_MCP9808 {  public:  Adafruit\_MCP9808();  boolean begin(uint8\_t a = MCP9808\_I2CADDR\_DEFAULT);  float readTempF( void );  float readTempC( void );  void shutdown\_wake( uint8\_t sw\_ID );  void shutdown(void);  void wake(void);  void write16(uint8\_t reg, uint16\_t val);  uint16\_t read16(uint8\_t reg);  private:  uint8\_t \_i2caddr;  };  #endif |
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Data collected on October 23, 2017 outside the premises of the University of Aruba shows an average of 32ºC and 33ºC between 11:30am and 12:00pm; an average of 32ºC and 34ºC between 12:00pm and 12:30pm. But for a moment that it became a little cloudy, the temperature decreased to 31ºC and 33ºC. But then it went back to 32ºC and 34ºC between 12:35pm and 12:40pm. Data taken from internet source (<https://www.accuweather.com/en/aw/oranjestad/12007/weather-forecast/12007> ) for the same day states 31ºC and close to the measurement taken with Air Sensor. The average temperature from Aruba during the month of October is minimum 26ºC and maximum 31ºC ( <http://www.holiday-weather.com/aruba/averages/october/> ). Our measurements show that the temperature taken today are exceeding the maximum average rate of the month of October.

Process: We went to an open place at the premises of the University of Aruba; to get the real effect of the temperature change and record viable data. We took our Sensor, plugged it to our computer and started running the software so that we could start getting our temperature data. We lifted the sensor and holded it steadily at an appropriate position that would allow the data to be precise and exact. As a result giving us viable and exact data of the temperature as well as data from its notable changes.

Pictures: Left - Microcontroller Arduino Nano, Right - Temperature sensor

