THE HONG KONG
POLYTECHNIC UNIVERSITY
香港理工大學

DEPARTMENT OF APPLIED PHYSICS
應用物理學系

# Automatic Weather Station (AWS)

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# Weather Information

- Temperature
- Relative Humidity
- Rainfall
- Ultra Violet Index (UVI)
- Solar Radiation
- Wind Speed & Direction
- Pressure

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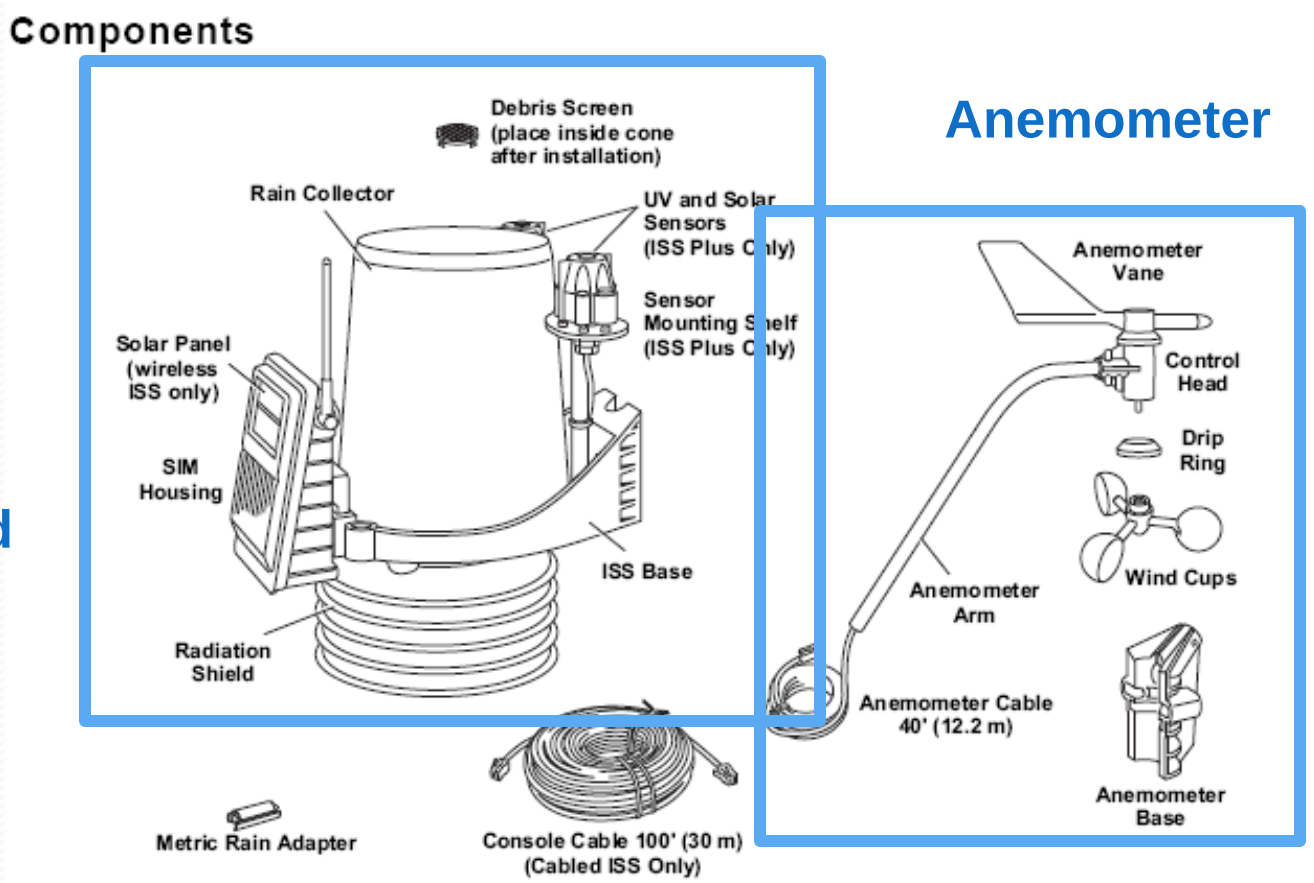
# All Components of AWS

**ISS (Integrated Sensors Station)**

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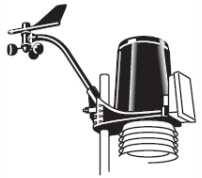
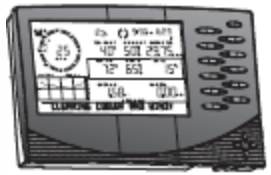
# Temperature & Relative Humidity

## Two Thermometers and two hygrometers in AWS

- Outdoor (ISS)



- Indoor (Console)



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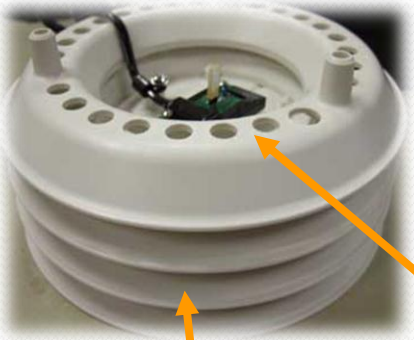
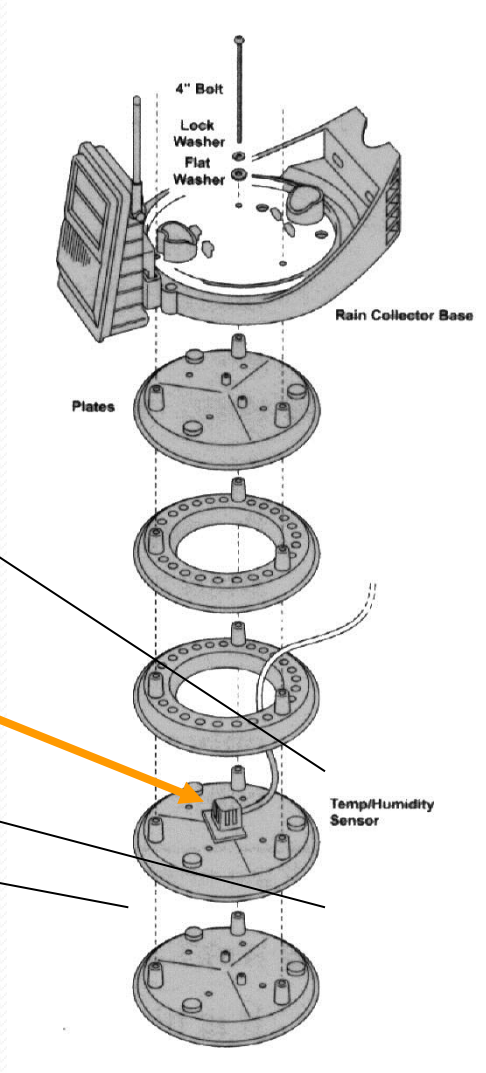
# Outdoor Sensors

- Inside Radiation shield






Sensor board

Radiation shield

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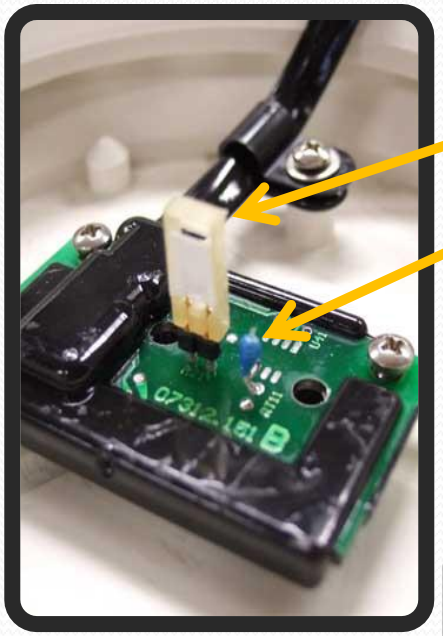
# Outdoor Sensors



**Old sensor board**

**Hygrometer**

**Thermistor**

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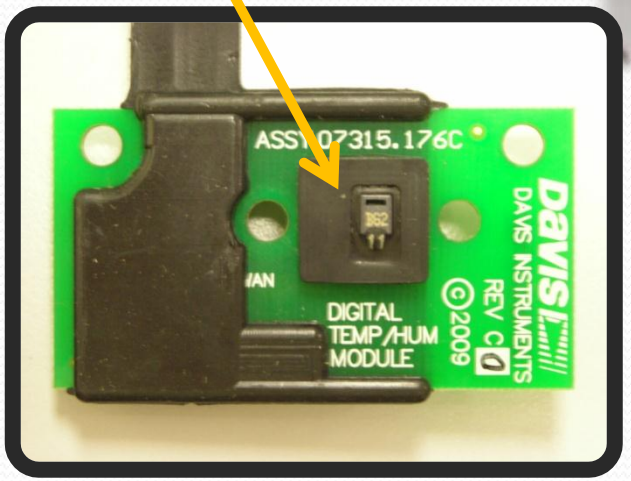
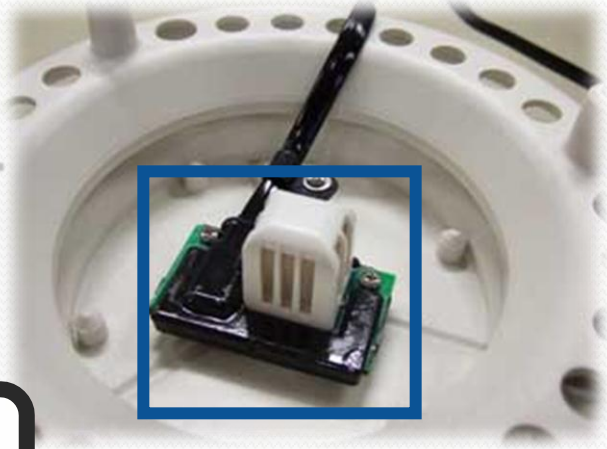
**New sensor board**

**IC sensors**



Inside radiation shield

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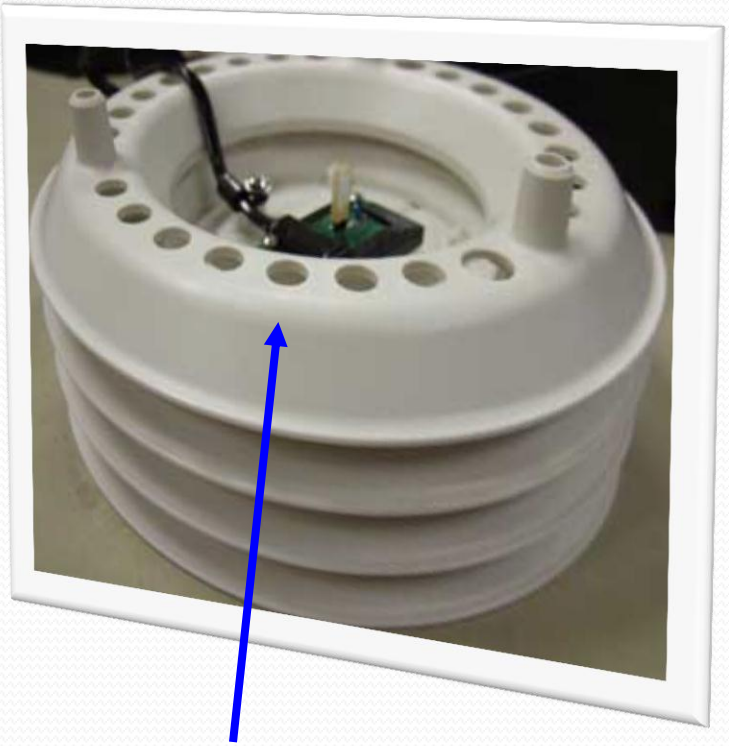
# Outdoor Sensors

Why should it be installed in the radiation shield?

- Dry air Temperature
- Prevent the direct solar radiation
- Good Ventilation



**Radiation Shield**

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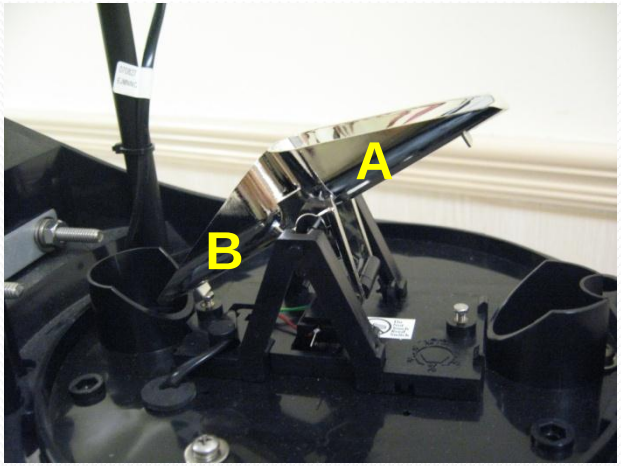
# Rainfall

- Funnel shape rain collector collects rain drops
- Tipping bucket type
- 1 tip = 0.2 mm
- Rainfall = tipping times x 0.2 mm

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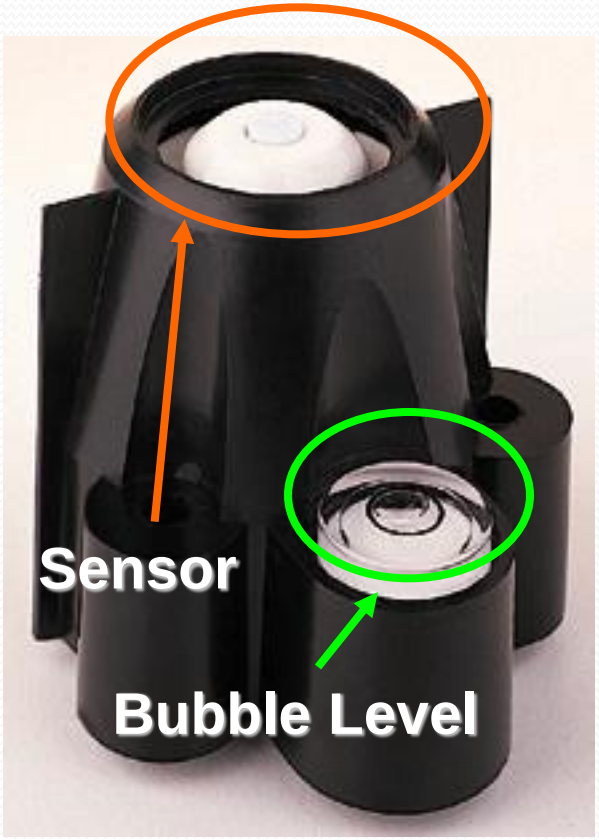
# Ultra Violet (UV) Index

- Wavelength(λ) for UVI: 295 to 325 nm
- Adjusted according to the sensitivity of human skin
  (McKinlay-Diffey Erythema action spectrum)
- No unit
- Typical value:
  - 15 (highest record in HK)

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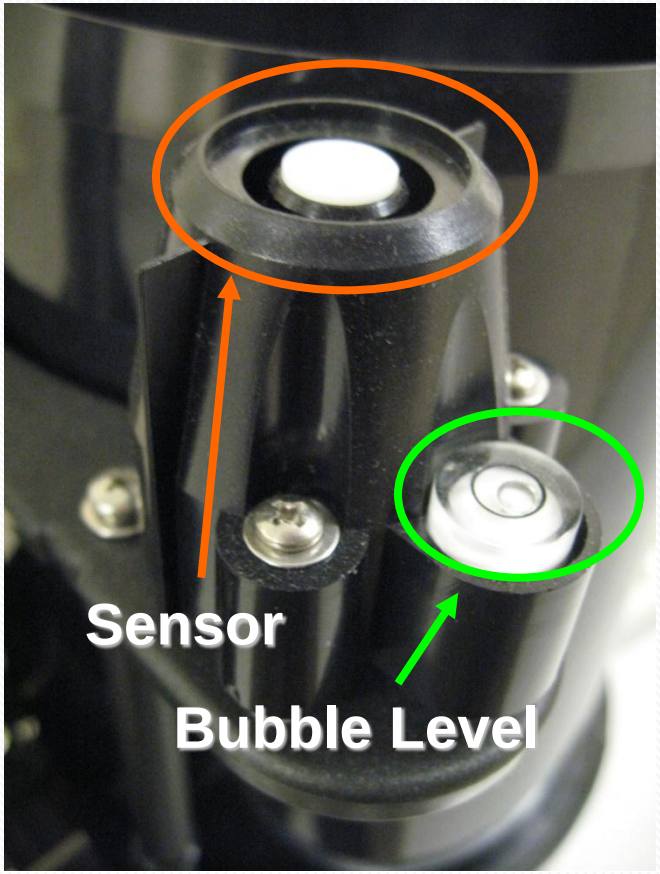
# Solar Radiation

- Power of sunlight on a surface - irradiance
- Unit:
  Watt per meter square ($Wm^{-2}$) - Power per unit area

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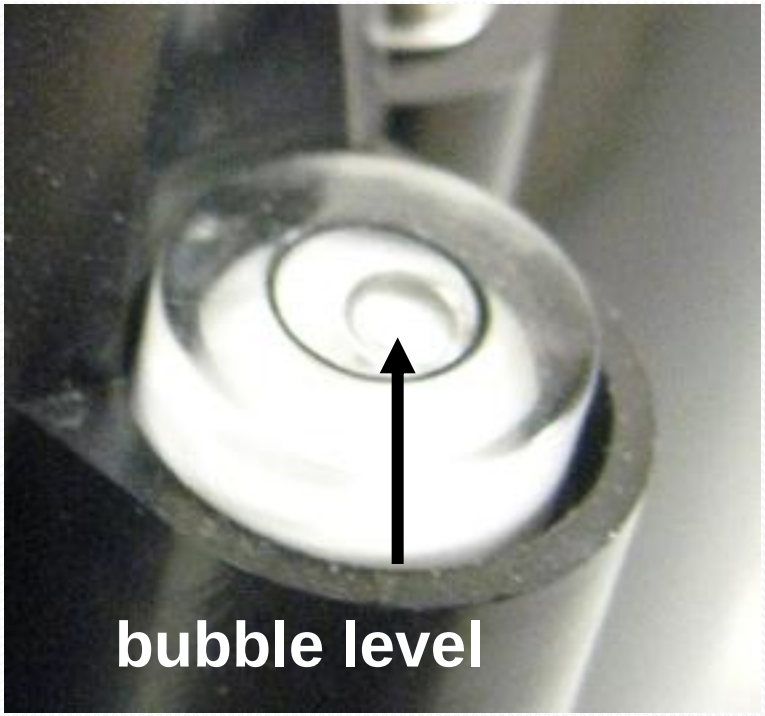
# Solar and UV sensor

## Bubble Level

- To ensure the sensor is horizontal to the sea level

## Why?

- Detect the non-directional radiation




**Adjust the sensors until the bubble is at the centre of the black circle**

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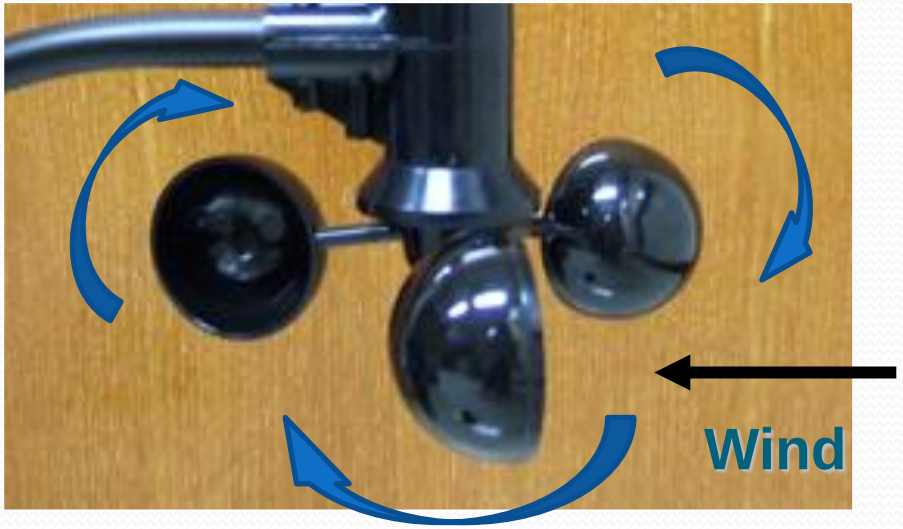
# Wind

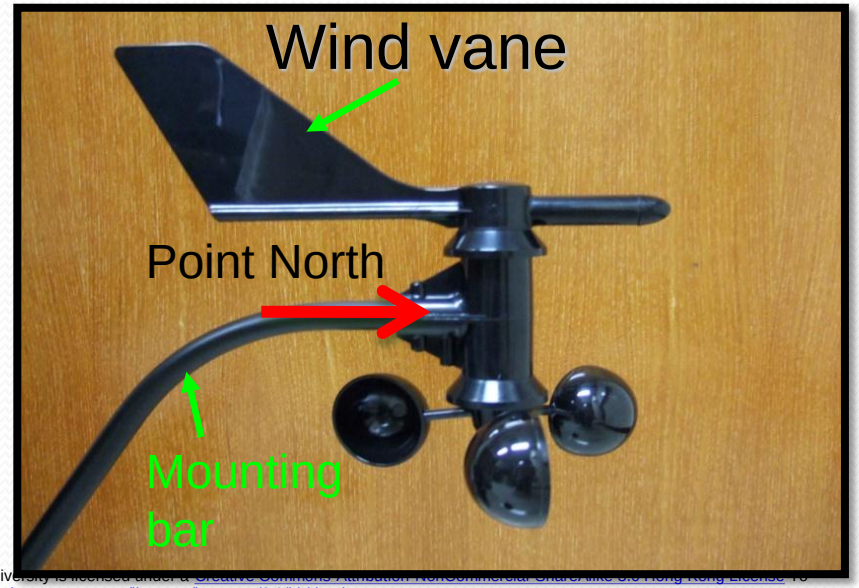
## Speed:

- Counting frequency of 2 metal clips in contact




## Direction:

- Wind vane points to where the wind come from
- Mounting bar must point to north when install

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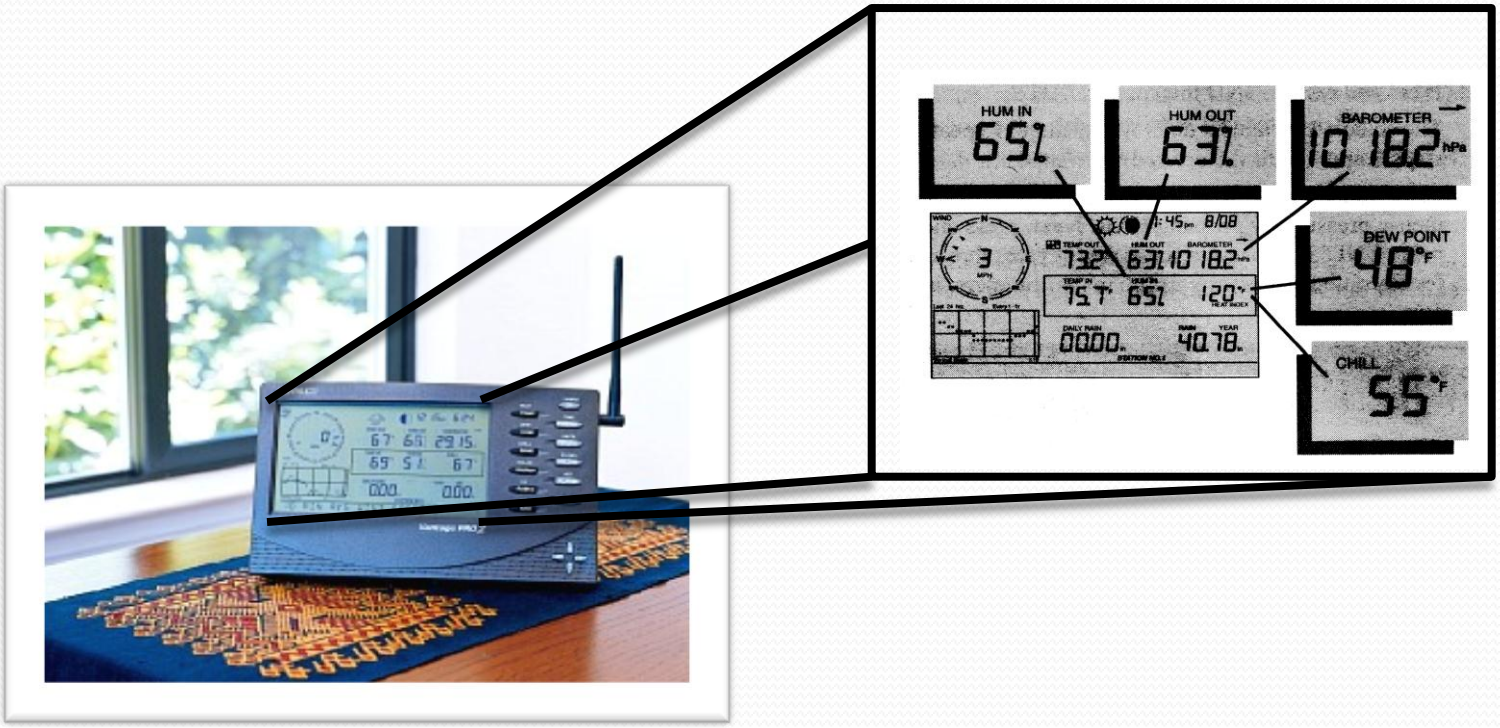
# Pressure

- Barometer in the console
- Working principle:
  - Measure the resistance of thin film (薄膜) in piezoresistive (壓阻式) sensor exerted by the atmosphere

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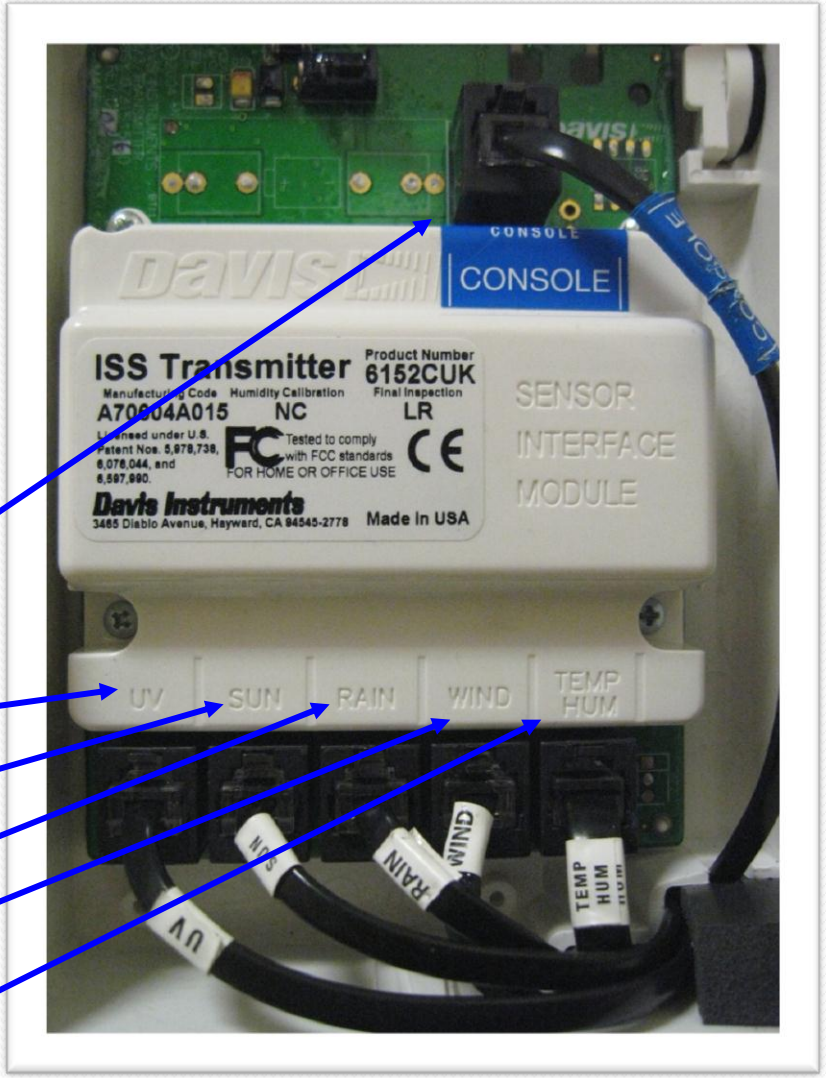
# Sensor Interface Module

- Collect raw data from all sensors
- Transmit coded data to the console
- Max range: 300m




**Console**

**UV**

**SUN**

**RAIN**

**WIND**

**TEMP & HUM**

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# The Console

- Receive and decode data from sensor interface module
- Display latest weather information
- Transfer data to computer for:
  - display and storage
  - webpage generation
  - sending back to Co-WIN database server

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# Co-WIN website

- Website: http://weather.ap.polyu.edu.hk/
- Co-developed by HKO and PolyU AP

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# Co-WIN website

- AWSs located at different school and organization members
- Keep sending data back every minute to Co-WIN database server in the Department of Applied Physics, HKPolyU via internet
- Provide latest weather information to the public
- As a local weather reference complementary to weather stations of HKO

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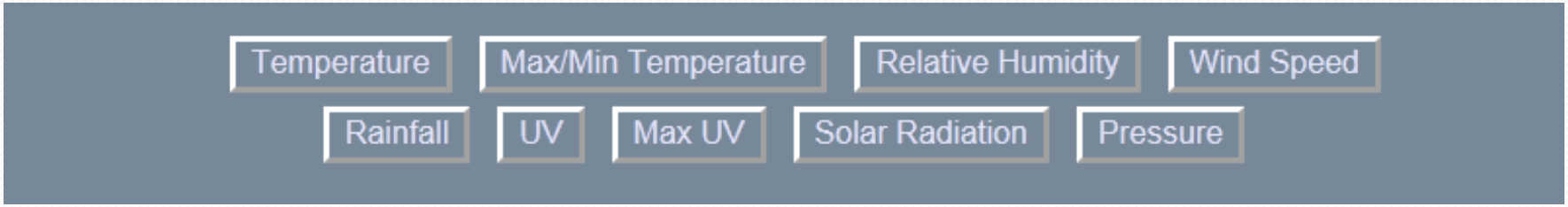
# Co-WIN website




- Parameters in weather map:
  - Temperature
  - Max/Min Temperature
  - Relative Humidity
  - Wind Speed
  - Rainfall
  - UV Index
  - Solar Radiation
  - Pressure

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# Co-WIN website

- View weather data history from different location
- Time series display

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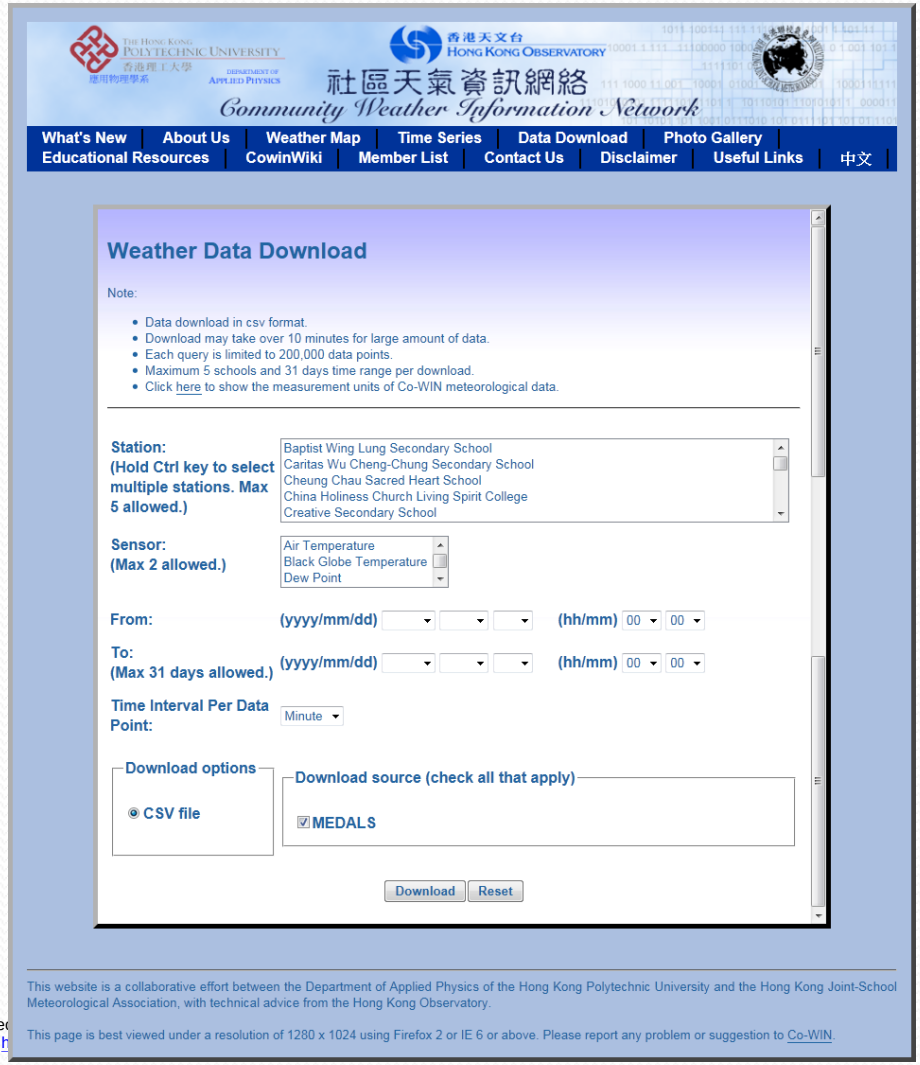
# Co-WIN website

- Download weather data history
- Data exported in .csv format
- MS Excel compatible

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# Co-WIN website

- Development
  - More weather information will be available soon
  - Release of new design with Google map
  - Integrate more functions for mobile learning

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# END

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