databot™ Sensor Starters

Grades: 6 & Up
Time: 15 Minutes - PDQ 1 & 2
Subject: Physics, Technology
Topics: Ultraviolet Radiation, UV index, wavelength

Meet the UV Sensor

The UV sensor senses Ultraviolet (UV) light wavelengths in the sunlight. If you're out running in the sun, this sensor can warn you if the UV index is dangerously high and you need to seek cover! This sensor is used in a variety of devices such as wearables (smartwatches & smart bands), hand-held UV meters, medical equipment, weather stations, and more.

What Does it Measure?

databot™'s UV Sensor measures UV wavelengths and calculates the **UV index**, a standardized rating for ultraviolet radiation intensity. UV is different from visible light which has longer wavelengths and is invisible to the human eye. Have you ever seen a "black" light poster or other black light display? These are examples of seeing UV!

How Does it Work?

Light is a part of electromagnetic spectrum that includes radio waves, microwave, infrared, visible light, UV light, x-rays, and gamma rays. All radiations are distinguished by their wavelength and frequency. When light strikes the photodiode in this sensor it generates current based on the light wavelength. The more UV radiation it receives the higher the current generated. This current is then measured and converted to the index value.

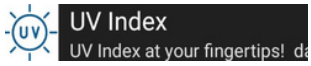
What Are the Units for UV Index?

The Global Solar UV Index represents the amount of skin-damaging UV radiation being delivered at any time. This scale is used to warn you of potentially dangerous UV levels when you are going to be outside.

Category	Index	Sun Protection Recommendations
Low	1 - 2	Wear sunglasses if bright; cover up; sunscreen.
Moderate	3 - 5	Cover up; sunscreen; stay in shade at midday.
High	6 - 7	Sunburn protection required; full cover & sunscreen.
Very High	8 - 10	Avoid sun between 11-4; full cover & sunscreen.
Extreme	11+	Unprotected skin burns in minutes. Highest protection.

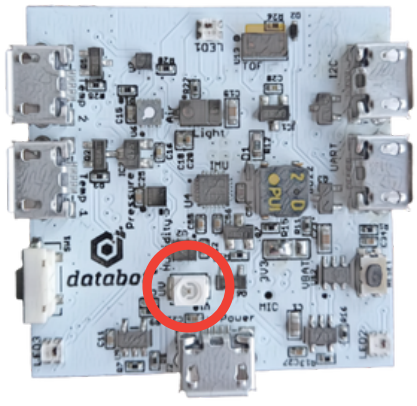
What You Will Need/Prep

- databot™ 2.0 & a smart device (iOS or Android).
- Read the Vizeey™ Fast Start Guide and install Vizeey™ if you haven't already.
- Scan the QR code for UV Index if you don't have it already.



Where Does it Live?

The UV sensor is a white rectangular chip with a circle inside it. Look closely near the rear power port on databot™ for the UV label and you will see it!



Important Terms

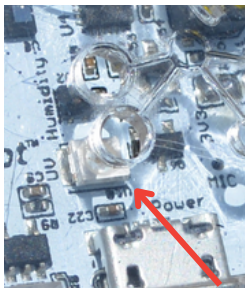
Ultraviolet (UV): UV light waves are tiny - 200-400 nanometers. A nanometer is one billionth of a meter (that's pretty small).
UV Index: A global solar scale that rates ultraviolet radiation intensity. People use this scale to prepare against sunburn.
Wavelength: Electromagnetic radiation like radio waves, visible light, or UV travels in waves with certain shape and length. The distance between peaks (high points) is called wavelength.

UV

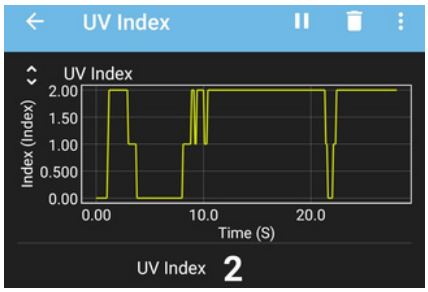
PDQ1 : Use the Shadow Sight

Using the databot™ UV sensor it is possible to find the UV index in your city! Your mission is to capture the UV index by experimenting with databot™ in sunlight and comparing it with the UV index published in the weather report. Are you being exposed to a safe or unsafe level of UV light?

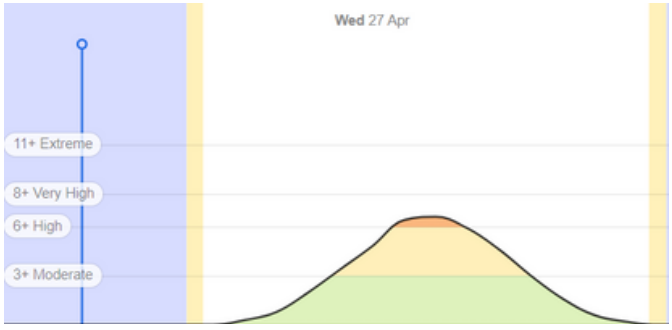
1. Tap on **UV Index** in Vizeey™ to load the experiment & use these icons to start and pause the experiment in the Main View:
2. Look at databot™, you will see a hole in the enclosure above the location of the UV sensor. In bright light you will see the shadow of a circle on the sensor board known as the "shadow sight".
3. Rotate and move your databot™ until you get the sight precisely centered on the UV sensor and note the UV index in the sunlight.
4. Do an Internet search for your city name and UV index. You should see a weather report that includes the UV index.
5. Compare your index findings with the UV index published in the weather report and determine if you are being exposed to an unsafe level of UV. How can you protect yourself from UV damage?



Shadow Sight



Captured UV index

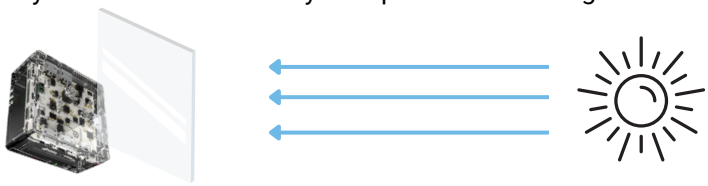


UV index published in a weather report

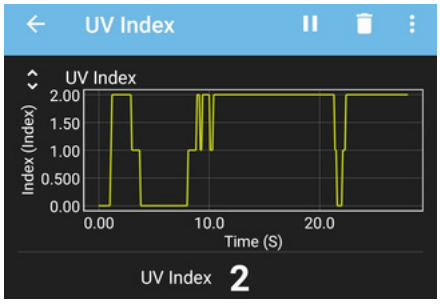
PDQ2 : Step Aside, Let the UV Through!

Using databot™ it is possible to experiment with Ultraviolet light. Your mission is to identify a transparent material that cuts down your UV Index by 50% or more. Be precise in your language and your data collection as you explore this challenge. Good luck.

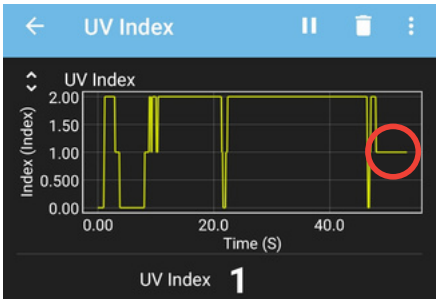
1. Tap on **UV Index** in Vizeey™ to load the experiment & use these icons to start and to pause the experiment:
2. Using your newly mastered **shadow sight** skills capture the UV index.
3. Place any transparent material like plastic, plastic wrap, glass, or other items in front of databot™ as an obstacle.
4. Repeat the same procedure and try different items until you find a drop in the UV index.
5. Record the UV index value and the material that cuts down the index by 50% or more.



Transparent glass material is placed as an obstacle between databot™ and the sunlight.



Before placing an obstacle



After placing an obstacle