databot™ Sensor Starters

Meet the Light Sensor

The light sensor senses light just like a thermometer senses temperature. Do you have solar pathway lights that come on at night? Have you noticed the streetlights coming on at dusk? These are all controlled by a light sensor that turns things on and off based on the light conditions. Cool!

What Does it Measure?

The ambient light sensor measures illuminance, a measure of light on a specific area. This is different from light intensity which measures the light level at the source. For example, a light bulb intensity is measured at the bulb, but if you're on the other side of the room, the amount of light on you, the "illuminance," is much less as the light is obstructed and scattered by obstacles and distance.

How Does it Work?

Light is made up of tiny particles of energy called photons. Imagine these tiny particles streaming from a light source and bouncing off a device (it's called a diode) that senses them. The more photons that strike the diode the more electrical current is generated. This current is then measured and converted in to numbers.

Photons coming in hot!!
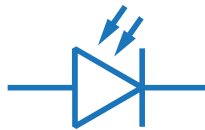
Symbol for a photodiode.

What Are the Units for Illuminance?

Lux is a unit of light measurement where the area is also taken into account. In other words – light intensity over a specific area. Lux is used to measure the amount of light output in a given area.

Condition	Illuminance (lux)
Full Daylight	10,000 - 16,000
Indoor Classroom	300 - 700

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 Illuminance if you don't have it already.

Illuminance
Come out of the dark! dat...
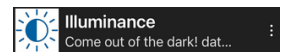
Where Does it Live?

The ambient light sensor is one sensor in a module located top center of your databot™ PCB. It is a multifunction module that also senses color, gesture, and proximity!

Important Terms

Illuminance: The measurement of the amount of **light falling and spreading** over a given surface area. Illuminance is the total luminance flux incident on a surface per unit area.

**Luminance**: Amount of **light emitted** by the source.

Luminous Flux: The measure of the **brightness** of the light source in terms of **energy** being emitted.

Lux: A unit of light measurement where the area is taken into account.

Grades, Time, Subject
Grades: 6 & Up
Time: 15 Minutes - PDQ 1 & 2
Subject: Physics, Technology
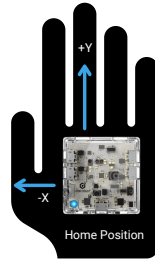**Topics**: Ambient Light Sensor, Illuminance

PDQ1 : Different spots in the room!

Using the databot™ **Illuminance** sensor it is possible to find the brightest and dimmest spot in your classroom! Your mission is to find the brightest and dimmest spots in the classroom and record the illuminance along with the location. Be precise in your language and your data collection as you map illuminance in your classroom. Good luck.
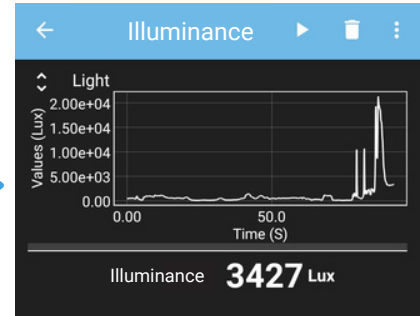
1. Tap on **Illuminance** in Vizeey™ to load the experiment & use these icons to start and to pause the experiment in the Main View:

2. Hold databot™ in the palm of your hand in the "home" position shown. Explore the classroom with databot™ trying to find the highest level of illuminance in the space. Note the illuminance value and the location that you determine is the brightest.
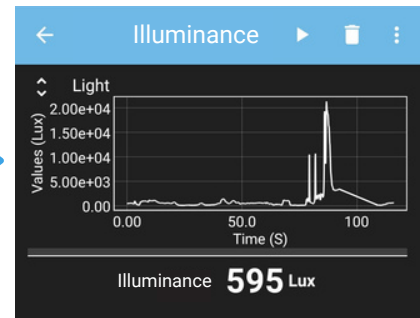
3. Next, seek the dimmest spot in the same fashion. Consider why some areas are dim and others are bright. Are there obstacles blocking the light? Note the illuminance value and the location you determine is the dimmest.

Brightest spot in the middle of the room. →

Dimmest spot in the corner behind the door. →

PDQ2 : Illuminance Vs Distance

In this PDQ, use the **Illuminance sensor** to visualize how illuminance varies as you move away from a light source. With databot™ in your hand move away from a fixed light source. Use a meter stick or tape measure to note distance. What is the illuminance value when the distance is 100 cm? How much does it vary from the value at 20 cm?

1. Tap on **Illuminance** in Vizeey™ to load the experiment & use these icons to start ar ⏸ se the experiment:

2. Set up the minimum distance of 20cm between the light source and databot™ as in the initial position shown. Turn databot™ towards the light source and record the illuminance value.

3. Increase the distance between the light source and databot™ by 20cm and record the illuminance value. Continue the same process till reaching the distance of 100cm.

Lower Illuminance ← → Higher Illuminance

Illuminance when the distance is 100 cm from the light source.

Illuminance when the distance is 20 cm from the light source