

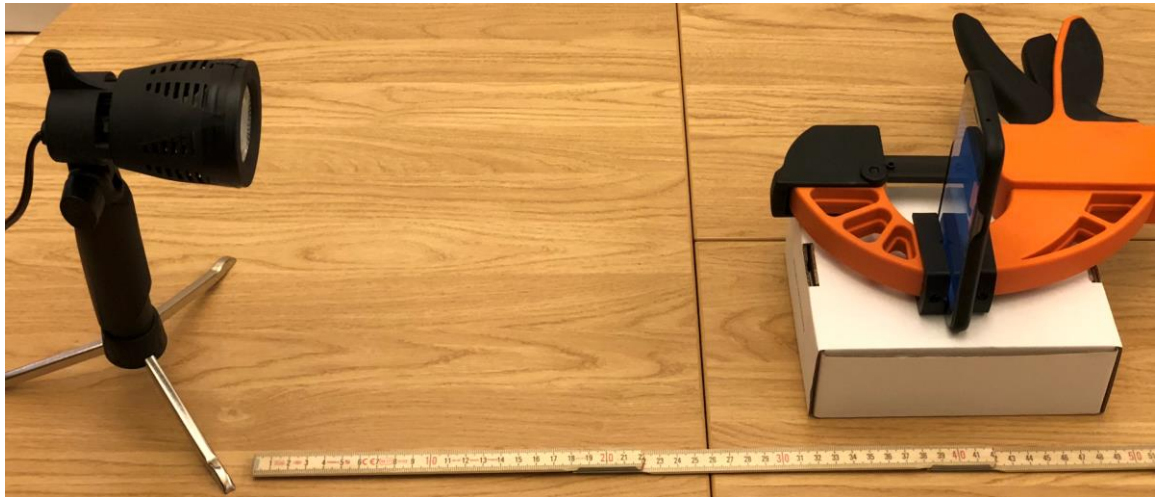


Physics Lab – Illuminance

With WF Smartphone Sensor Toolkit

Abstract

This physics lab demonstrates how the WF Smartphone Sensor Toolkit can be used to investigate the distance dependency of the illuminance of a light source. Download the example VI to get started.



Problem/Task

Study the distance dependency of the illuminance of a point like light source. The measured illuminance of a point like light source (e.g., a light bulb) is inversely proportional to the square of the distance.

Solution

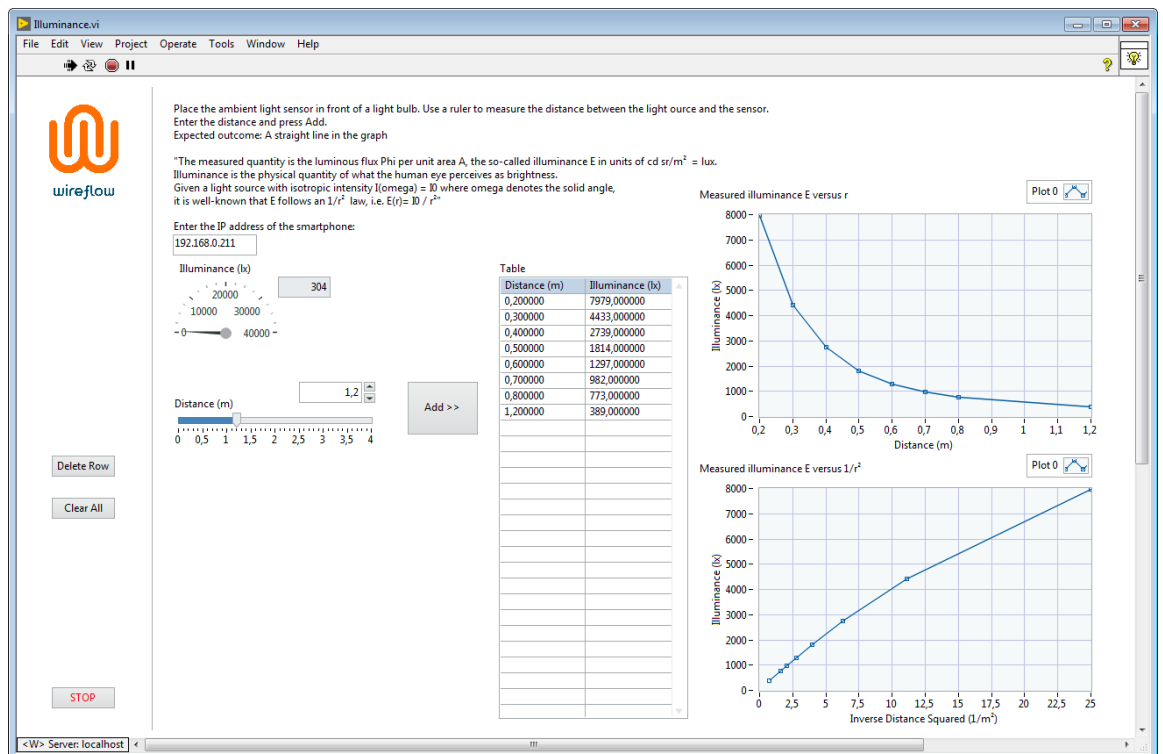
Smartphones contain ambient light sensors that measure the illuminance, which is the physical quantity of what the human eye perceives as brightness. Use the WF Smartphone Sensor Toolkit to measure the illuminance at known, sufficiently large distances ($r > 0.2$ m) from a light bulb.

Steps

1. Create an experimental setup similar to the figure above.
2. Download and install WF Smartphone Sensor Toolkit from www.wireflow.se/product/wf-smartphone-sensor-toolkit.
3. Start the WF Smartphone Sensor Toolkit app in the smartphone. The app presents the IP address of the phone.
4. Download and open the LabVIEW VI (Illuminance.vi), which is available as a zip file from www.wireflow.se/product/wf-smartphone-sensor-toolkit (AB0005-095 AN12 Physics Lab - Illuminance examples.zip).
5. Enter the IP address of the phone in the string control on the VI front panel. TCP is already selected as the communication method as a constant input to SensorAPI_Init.vi.
6. Run the VI and observe the measured illuminance.



7. Place the smartphone at an initial distance from the light source of at least 0.2 m.
8. Measure the distance with a ruler and manually add it to the Distance control on the VI front panel.
9. Click Add >> to store the data point.
10. Move the smartphone away from the light source at the desired step size.
11. Repeat from step 7 until done.
12. The screenshot below shows an example of an experiment.



Sources

<https://en.wikipedia.org/wiki/Illuminance>

https://www.researchgate.net/profile/Pascal_Klein2/publication/263737749_Classical_experiments_revisited_Smartphones_and_tablet_PCs_as_experimental_tools_in_acoustics_and_optics/links/56f05ac808ae584badc9329f/Classical-experiments-revisited-Smartphones-and-tablet-PCs-as-experimental-tools-in-acoustics-and-optics.pdf

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