

LDR / Photoresistor

Sensors / Analog sensing

Build a light-sensitive divider and turn ADC readings into thresholds.

01 Voltage divider

Wiring

VCC -> LDR -> ADC node -> 10 kohm resistor -> GND.

Behavior

More light usually lowers LDR resistance, raising voltage with this arrangement.

Formula

$V_{out} = VCC \times R_{fixed} / (R_{LDR} + R_{fixed})$.

Reverse

Swap LDR and resistor to make brighter light produce a lower reading.

02 Choose & calibrate

Resistor

10 kohm is a starting point; match it to LDR resistance near your target brightness.

Sampling

Average several ADC readings; measure dark and bright values in place.

Threshold

Add hysteresis: different turn-on and turn-off thresholds prevent flicker.

03 ADC rules

Voltage

Power the divider from an ADC-safe rail. Uno usually 5 V; Pico 3.3 V.

Meaning

Raw ADC values are relative brightness, not lux without characterization.

Before you power on

Do not feed a divider powered at 5 V directly into a 3.3 V ADC.

Datasheets & further reading

SparkFun: voltage, current & resistance

<https://learn.sparkfun.com/tutorials/voltage-current-resistance-and-ohms-law/all>