

OUR OBJECTIVE :

Create a competitive pyranometer prototype.

- Affordable alternative to market models
- Accurate solar irradiance readings
- Reproducible design

BACKGROUND :

Kilowatts for Humanity provides renewable off-grid electrification to developing countries using rooftop solar stations.

Provided services:

- Refrigeration
- Device charging
- Offline servers.



VALUE PROPOSITION :

Solar panels require continuous maintenance and monitoring.

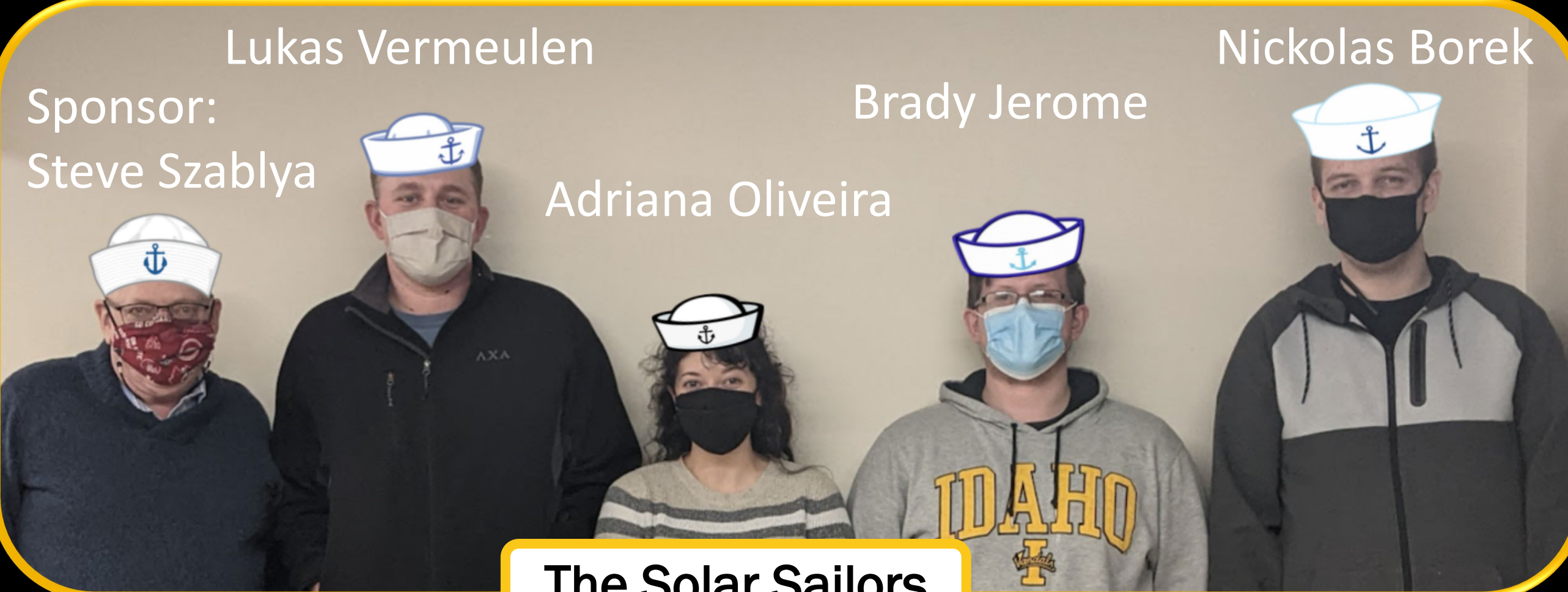
- Pyranometers are installed alongside solar panels
- Data in (W/m^2) confirms energy absorption in panels
- Monitors solar panel cleaning and maintenance needs

KEY REQUIREMENTS :

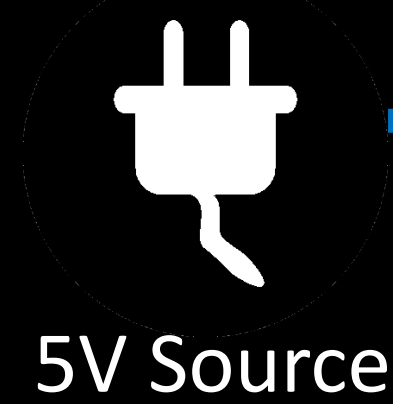
\$20 - \$80 / PROTOTYPE

LESS THAN 15% ERROR

INSTRUCTIONS & PARTS LIST



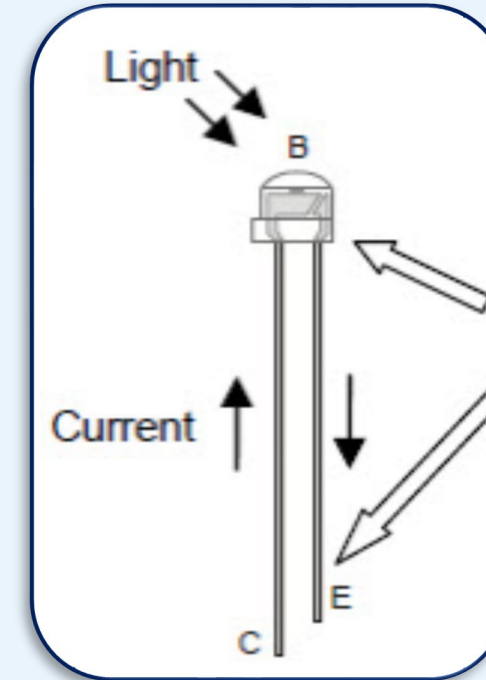
The Solar Sailors



Analog Output

CONCEPT DEVELOPMENT:

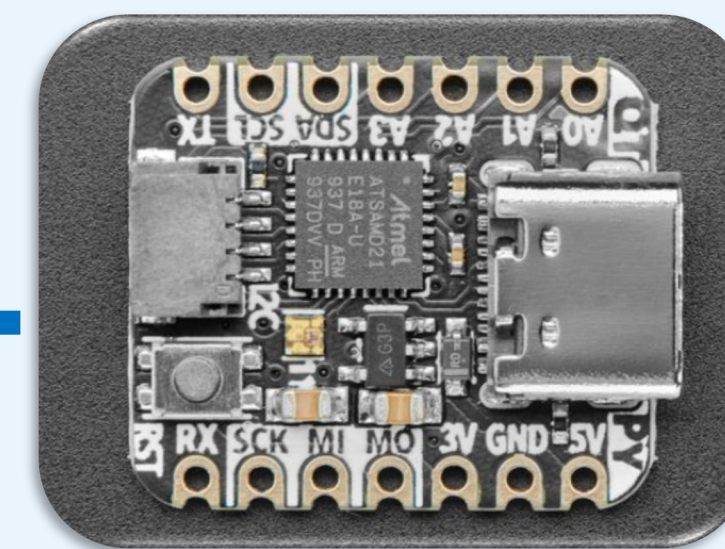
LIGHT SENSOR:



SFH 3310 Phototransistor

- Field of view: 150°
- Cost: \$0.64/unit (10 pack)
- Wavelengths: 350-970 nm

MICROCONTROLLER:



Adafruit QT Py - SAMD21 Dev

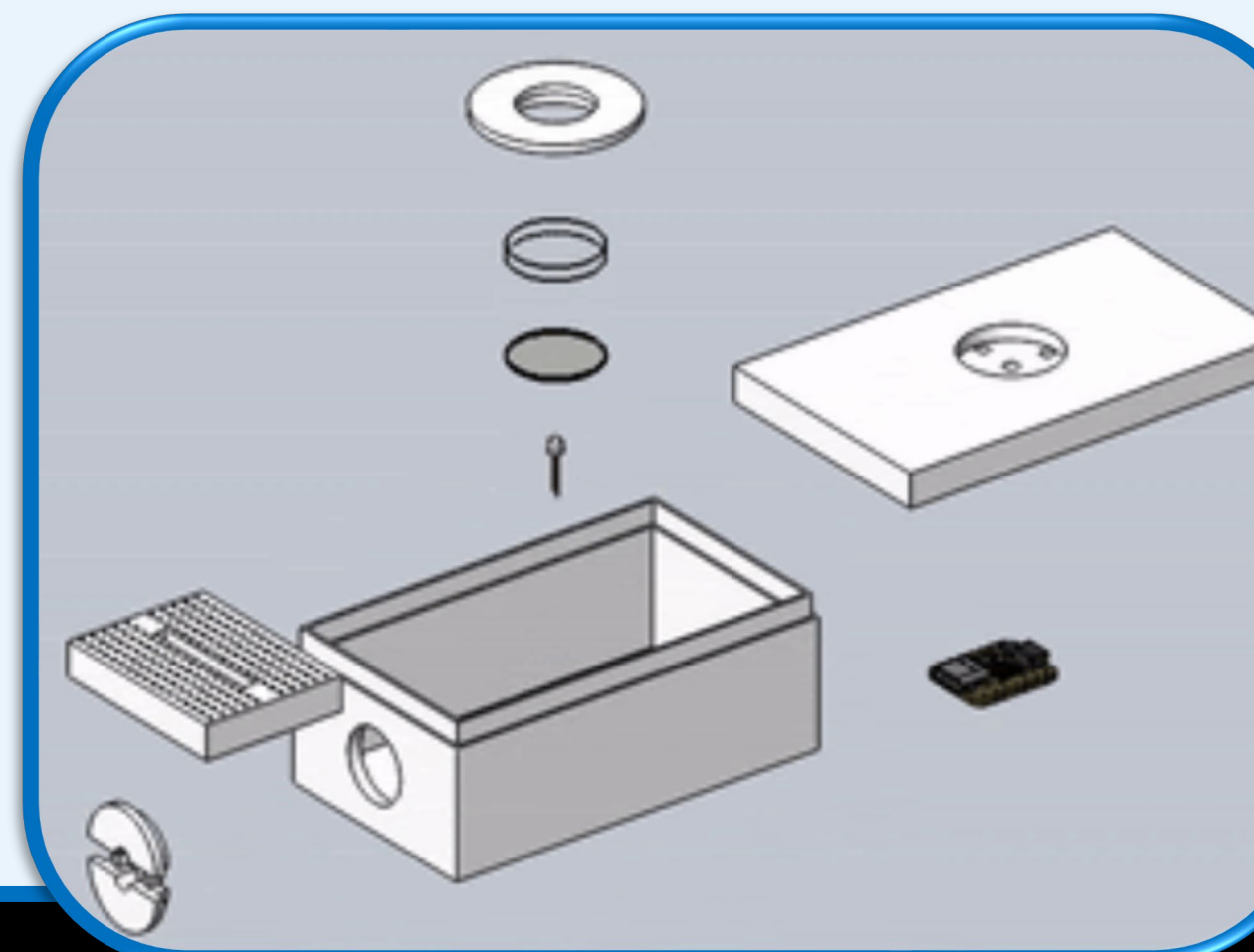
- Compact: 20 x 17.5mm
- Cost: \$6.00 each
- 10-bit DAC Output

V-I CONVERTER:

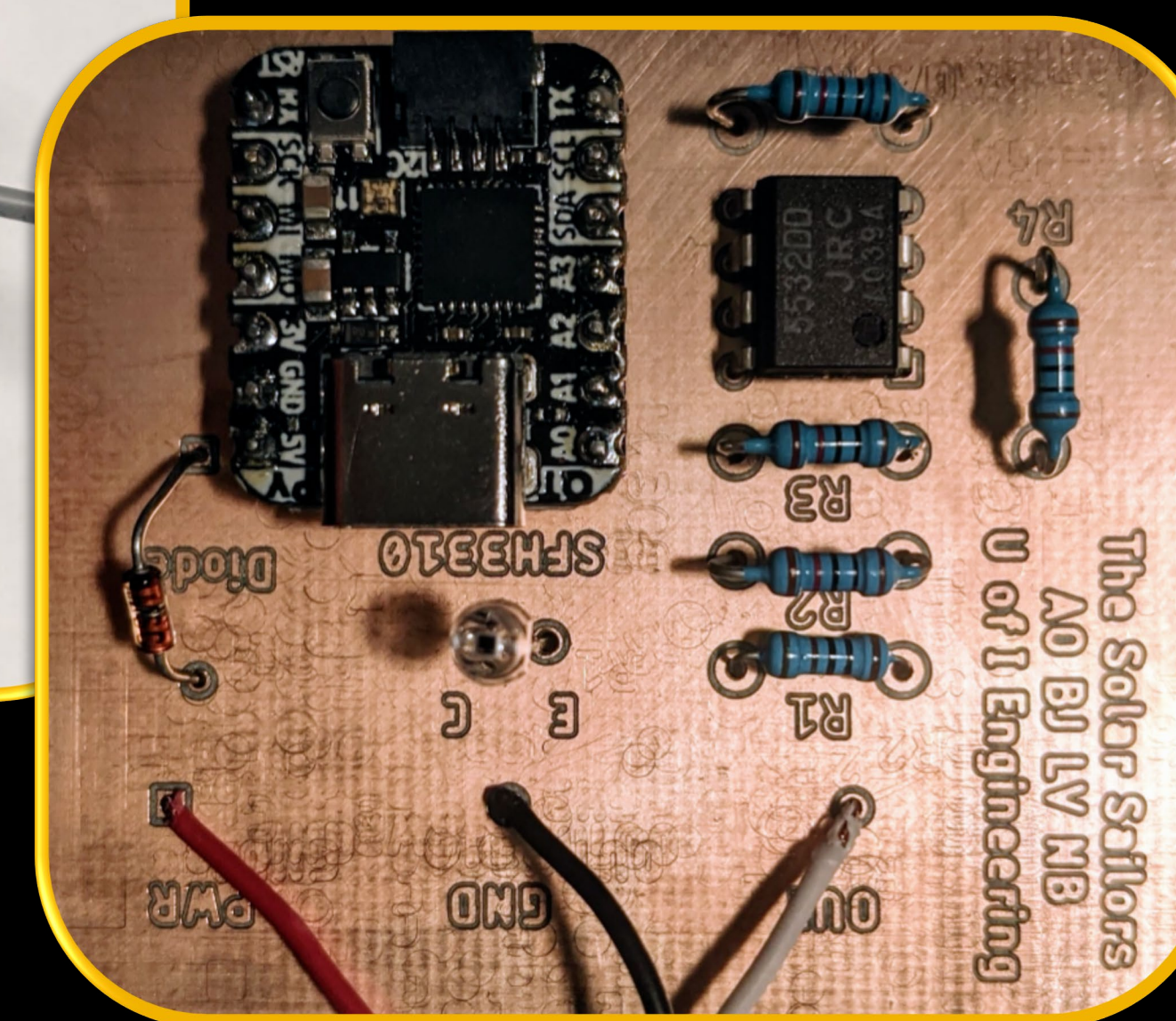
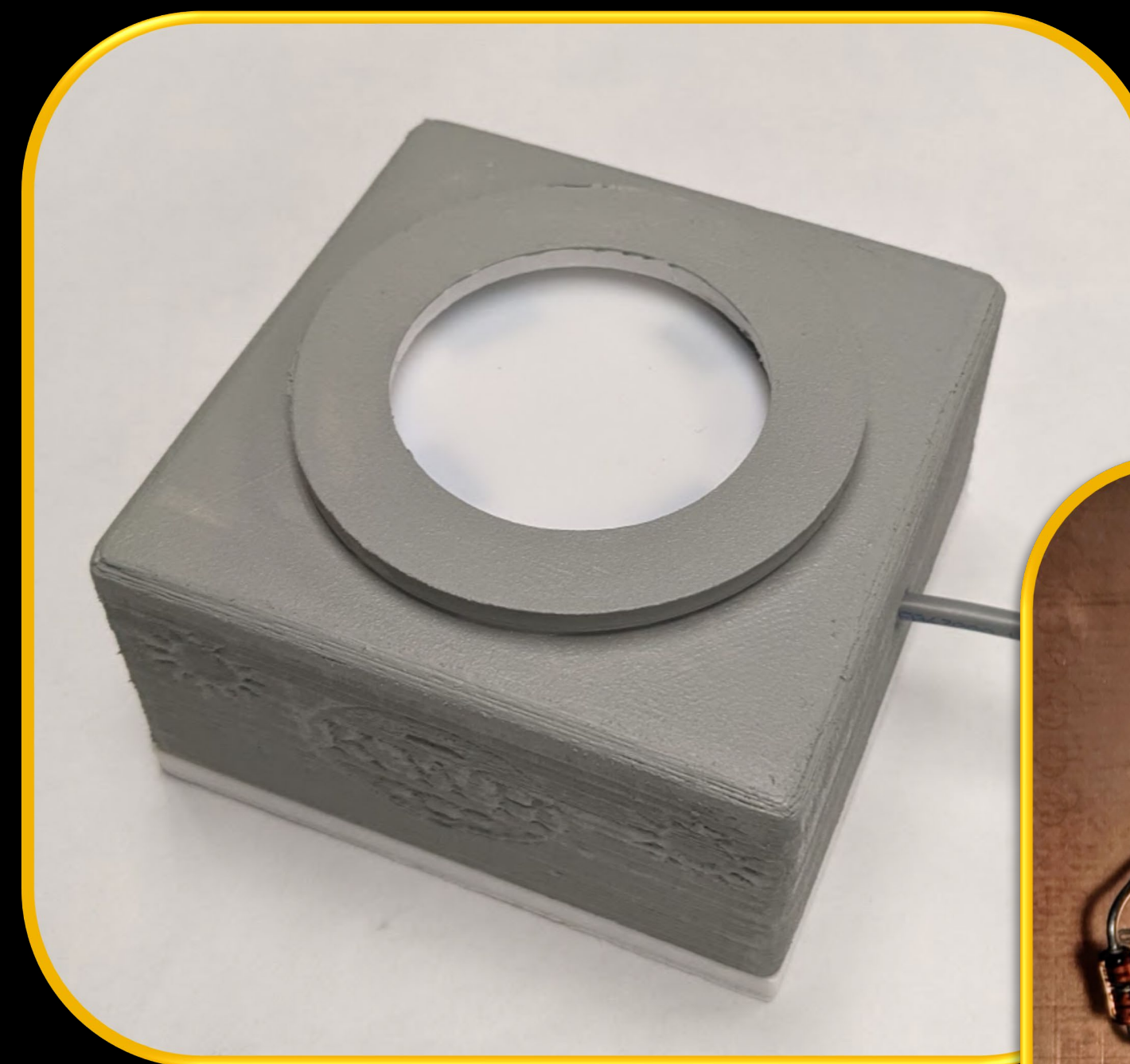
- 4 - 20 mA output
- Removes voltage drop

CASE DESIGN:

- 3D Printed PETG
- Fasteners for weatherproofing
- Acrylic disk
- Teflon sheets



INTRODUCING THE PV MATEY



Acknowledgments:

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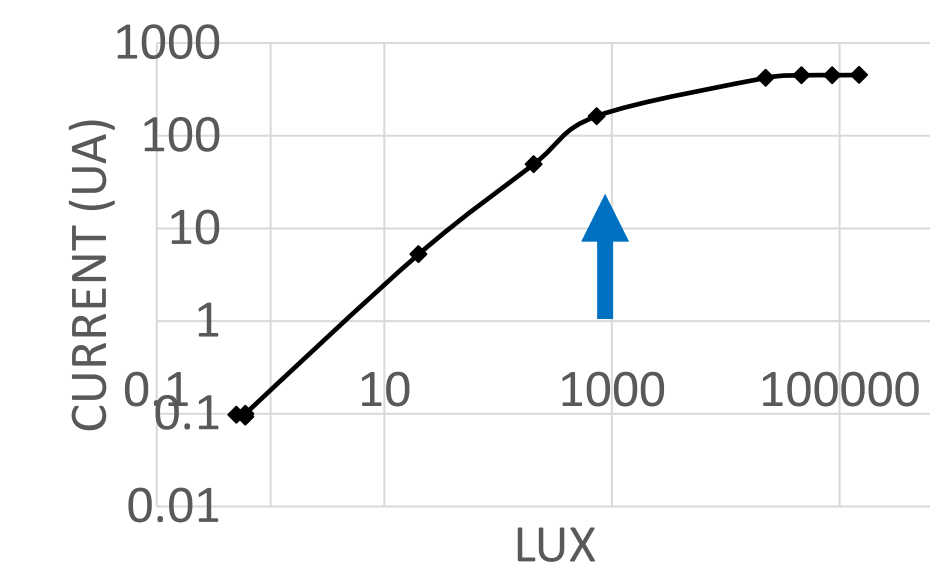
VALIDATION:

Tinker CAD Simulations:

Verified circuit compatibility with microcontroller

Sensor Test:

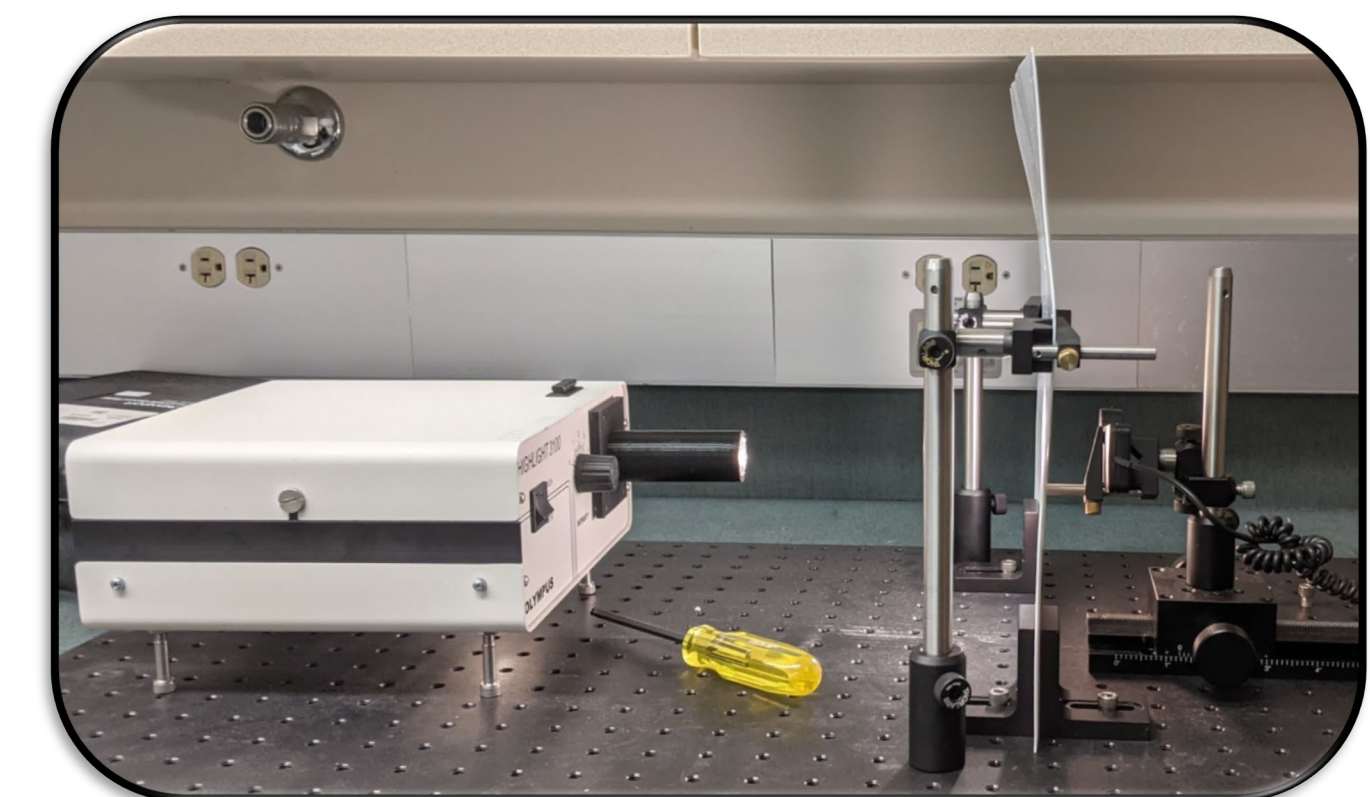
PHOTOCURRENT



- Saturation occurs above 1000 Lux.
- Filtering needed

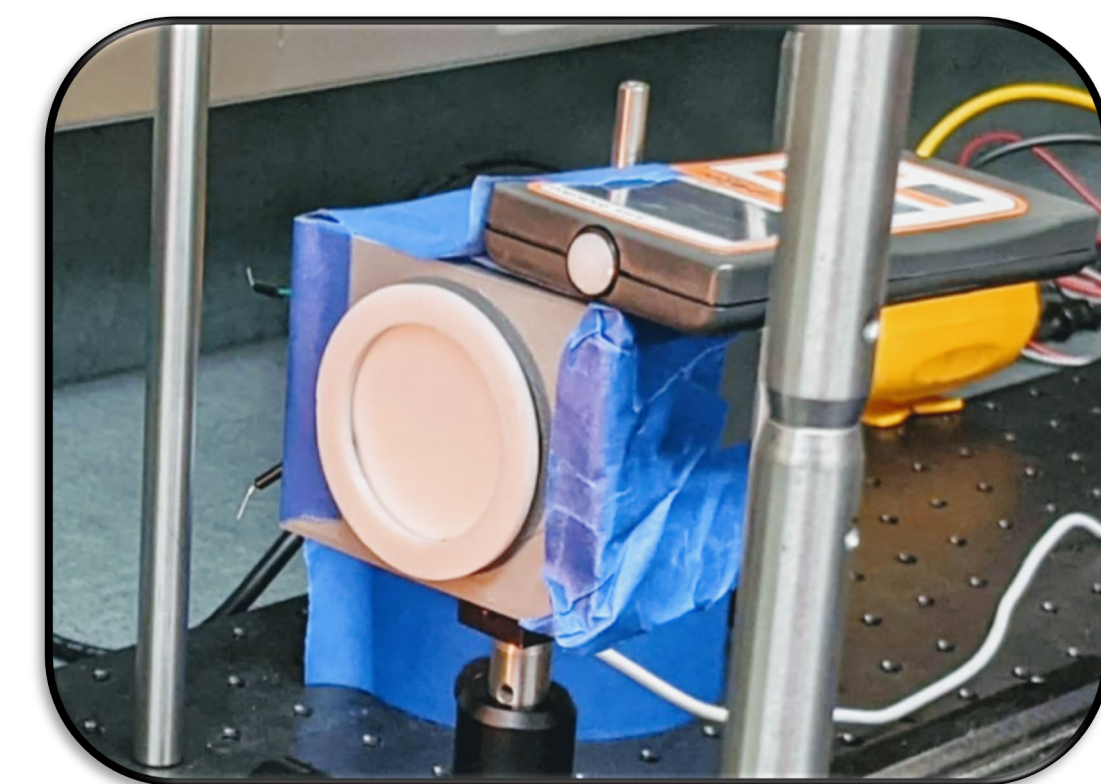
Teflon Sheet Filter Test:

Evaluated and corrected sensor saturation



Teflon filters 73.8%

Calibration and Verification Testing:



Compared with MP-100: Pyranometer Integral Sensor

SUMMARY:

- Current costs: \$22/ build
- Calibrated with MP-100 model
- Accuracy: ~80%

RECOMMENDATIONS:

- Print professional PCB
- Run weather proofing analysis
- Test alternative sensors

