



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/m²) confirms energy absorption in panels
- Monitors solar panel cleaning and maintenance needs

KEY REQUIREMENTS :

\$20 - \$80 / PROTOTYPE

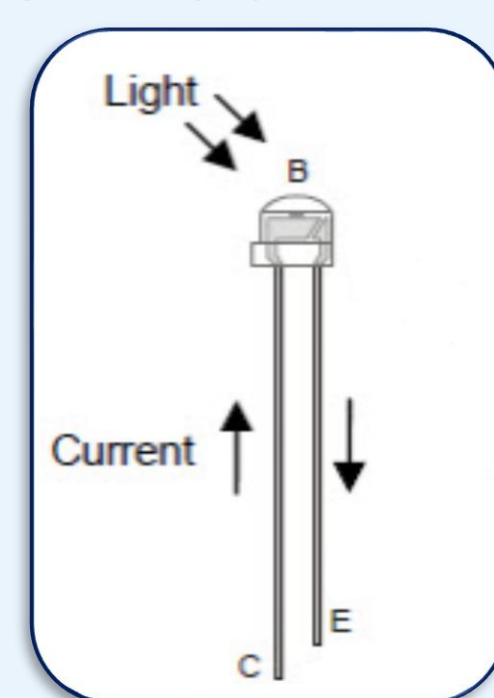
LESS THAN 15% ERROR

INSTRUCTIONS & PARTS LIST



CONCEPT DEVELOPMENT:

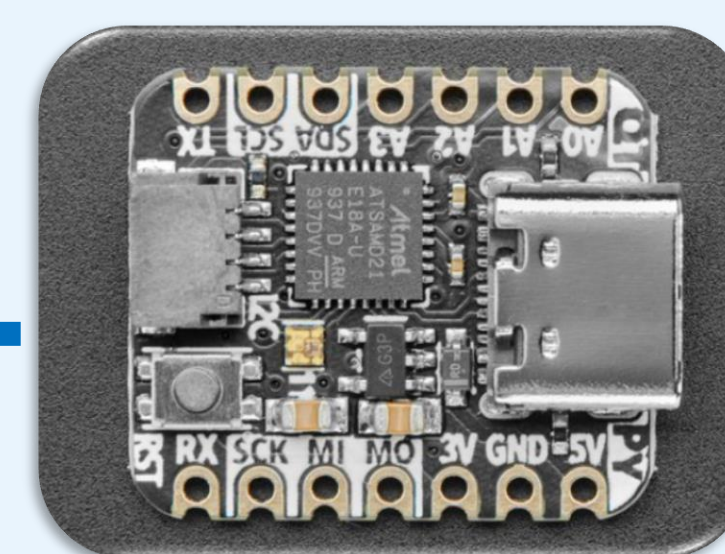
LIGHT SENSOR:



SFH 3310 Phototransistor

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

MICROCONTROLLER:



Adafruit QT Py - SAMD21 Dev

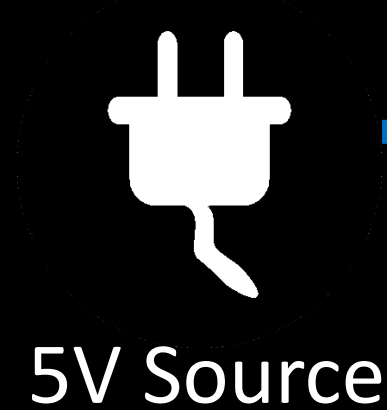
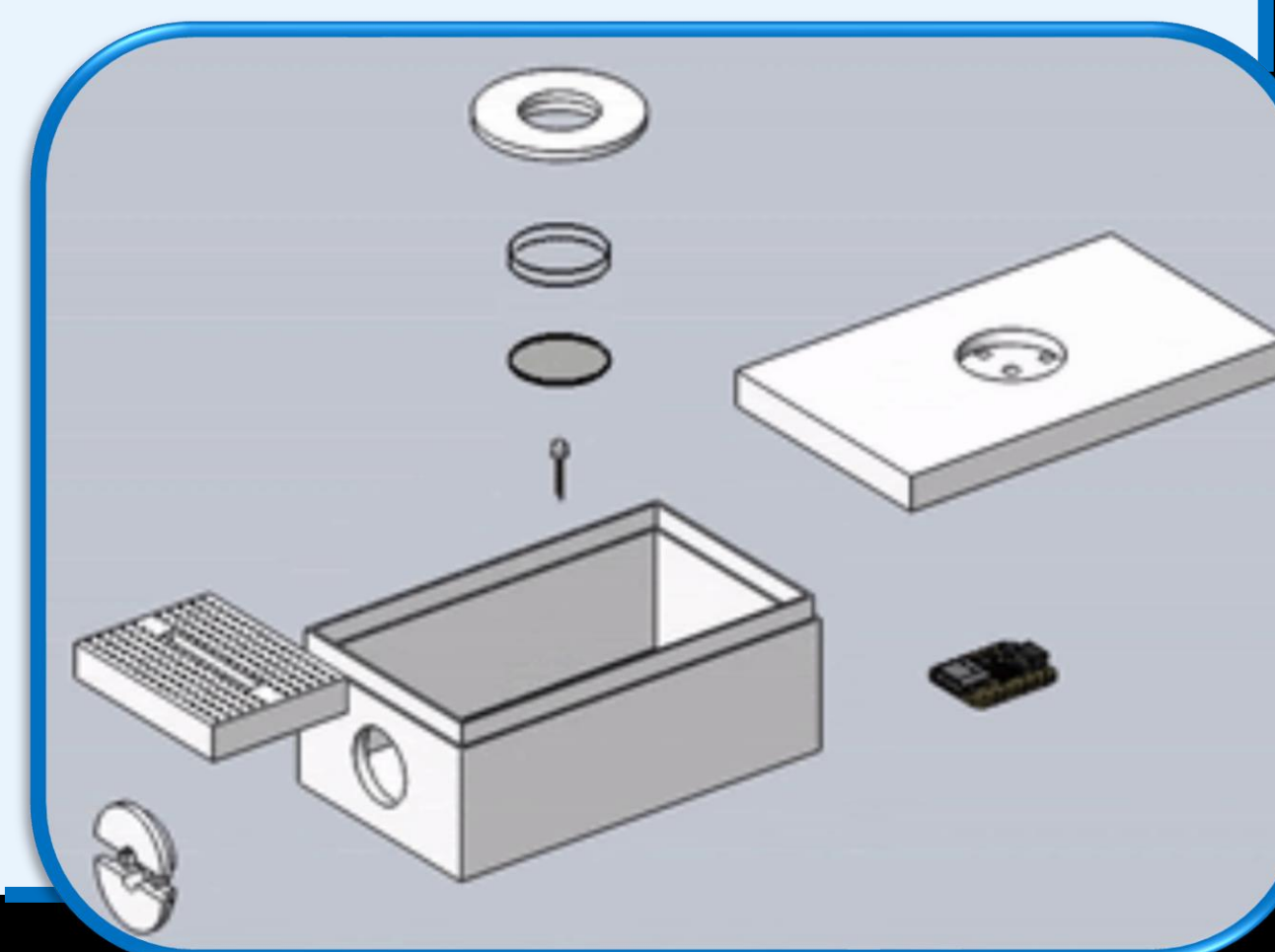
- Compact: 20 x 17.5mm
- Cost: \$6.00 each
- 10-bit DAC Output

V-I CONVERTER:

- 4 - 20 mA output
- Removes voltage drop

CASE DESIGN:

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



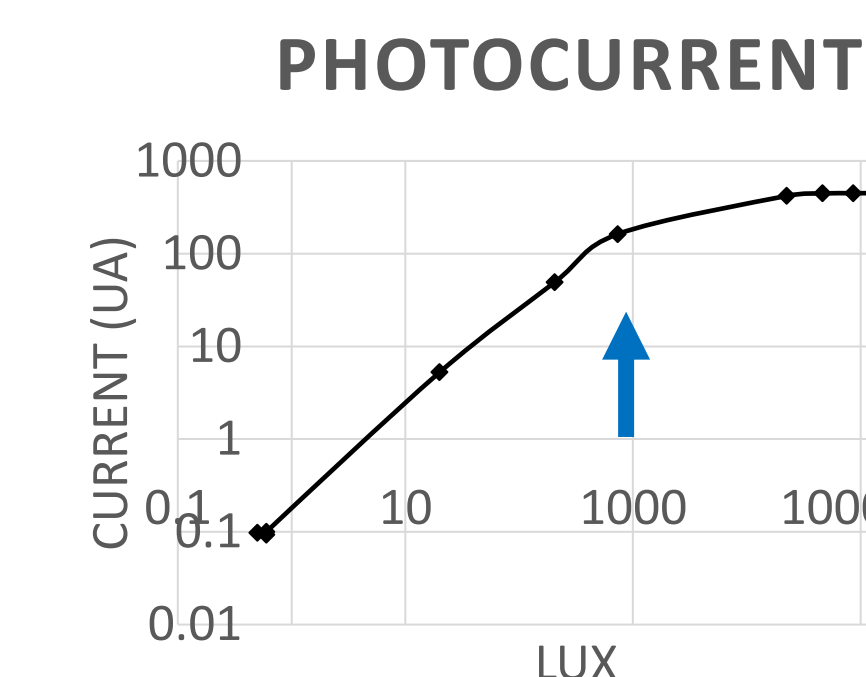
Analog Output

VALIDATION:

Tinker CAD Simulations:

Verified circuit compatibility with microcontroller

Sensor Test:



- Saturation occurs above 1000 Lux.
- Filtering needed

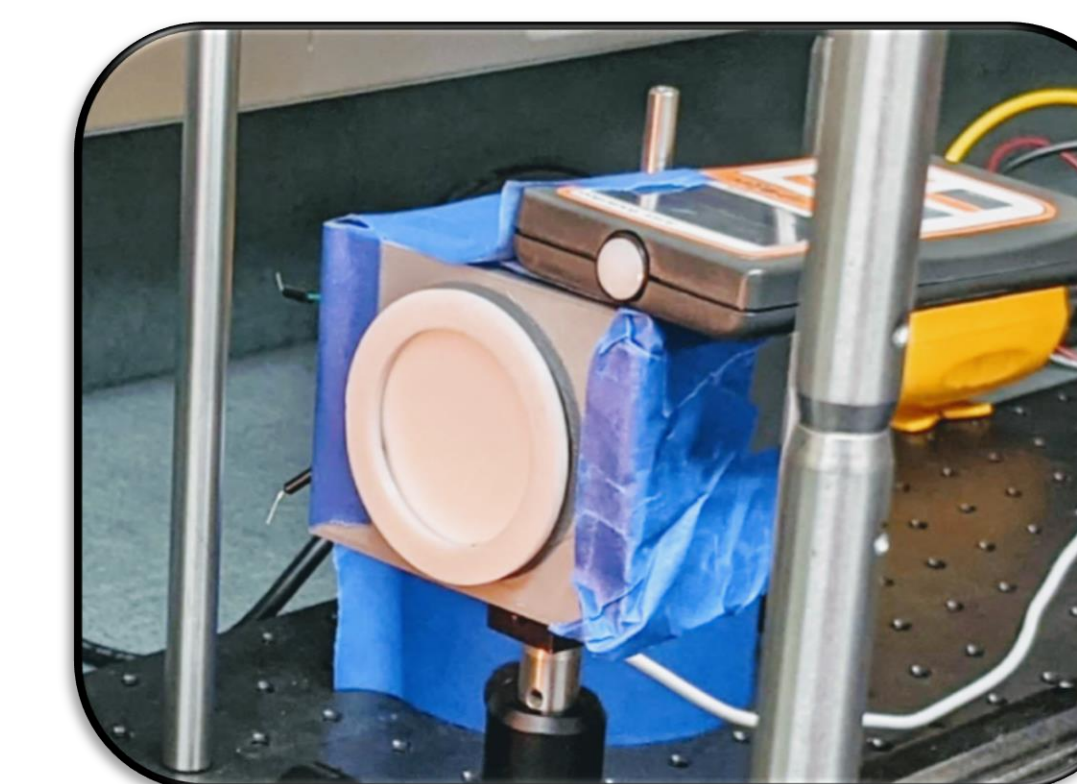
Teflon Sheet Filter Test:

Evaluated and corrected sensor saturation



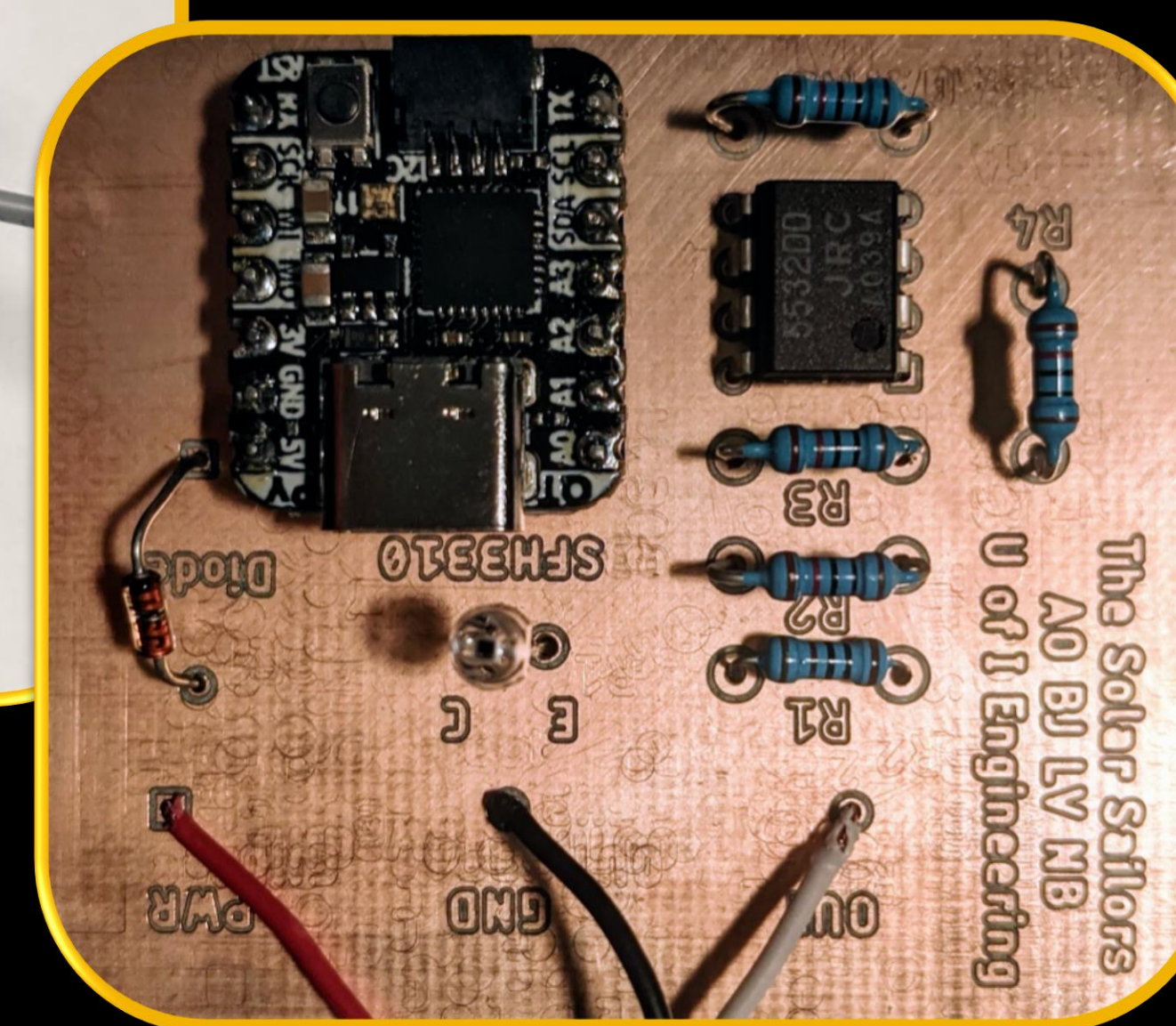
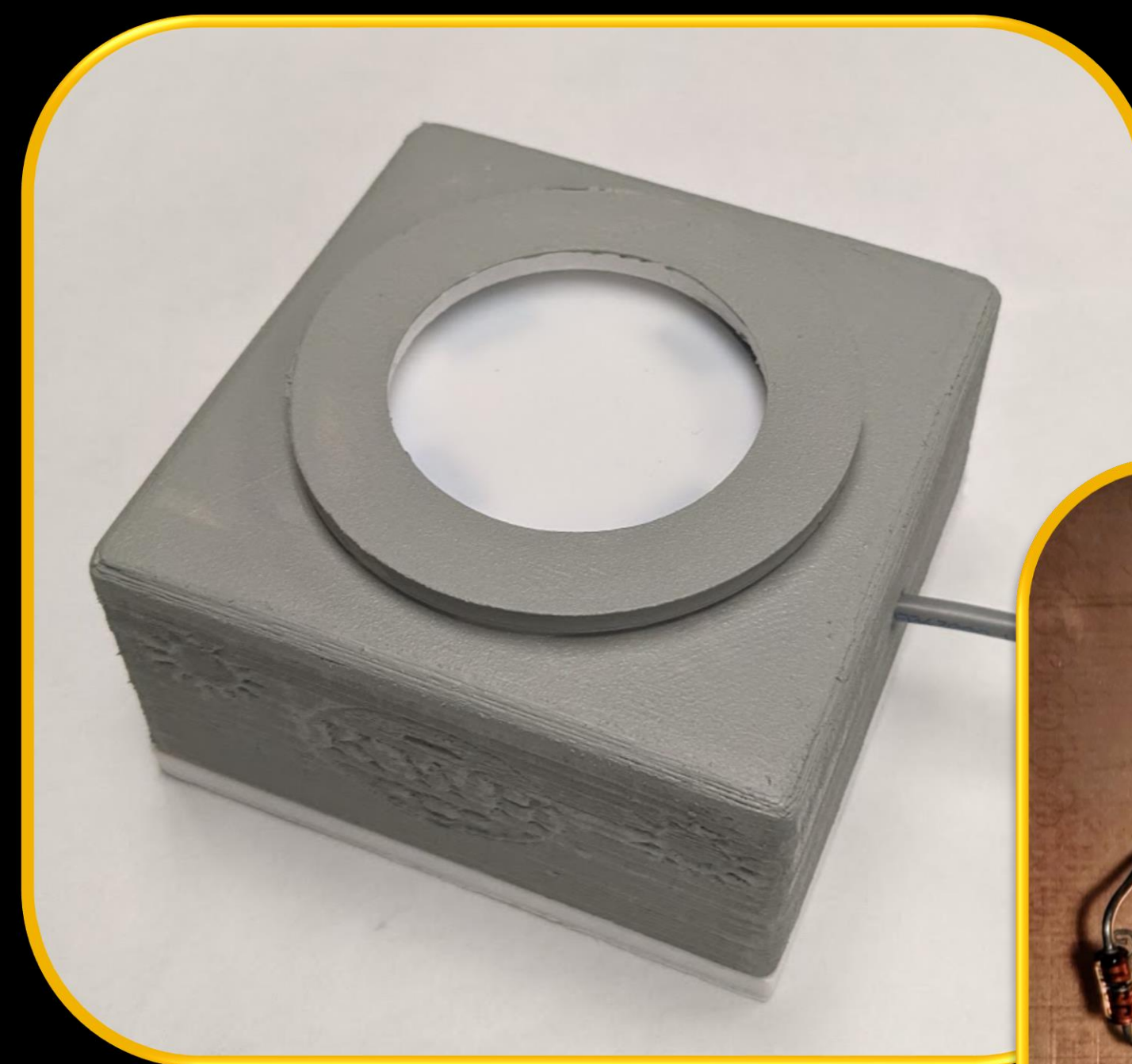
Teflon filters 73.8%

Calibration and Verification Testing:



Compared with MP-100: Pyranometer Integral Sensor

INTRODUCING THE PV MATEY



Acknowledgments:

Thank you, Steve Szablya and Kilowatts for Humanity, for sponsoring this project. Special thanks to Dr. Li, Dr. Johnson, Dr. Ay, and Wei Hu.

SUMMARY:

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

RECOMMENDATIONS:

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

