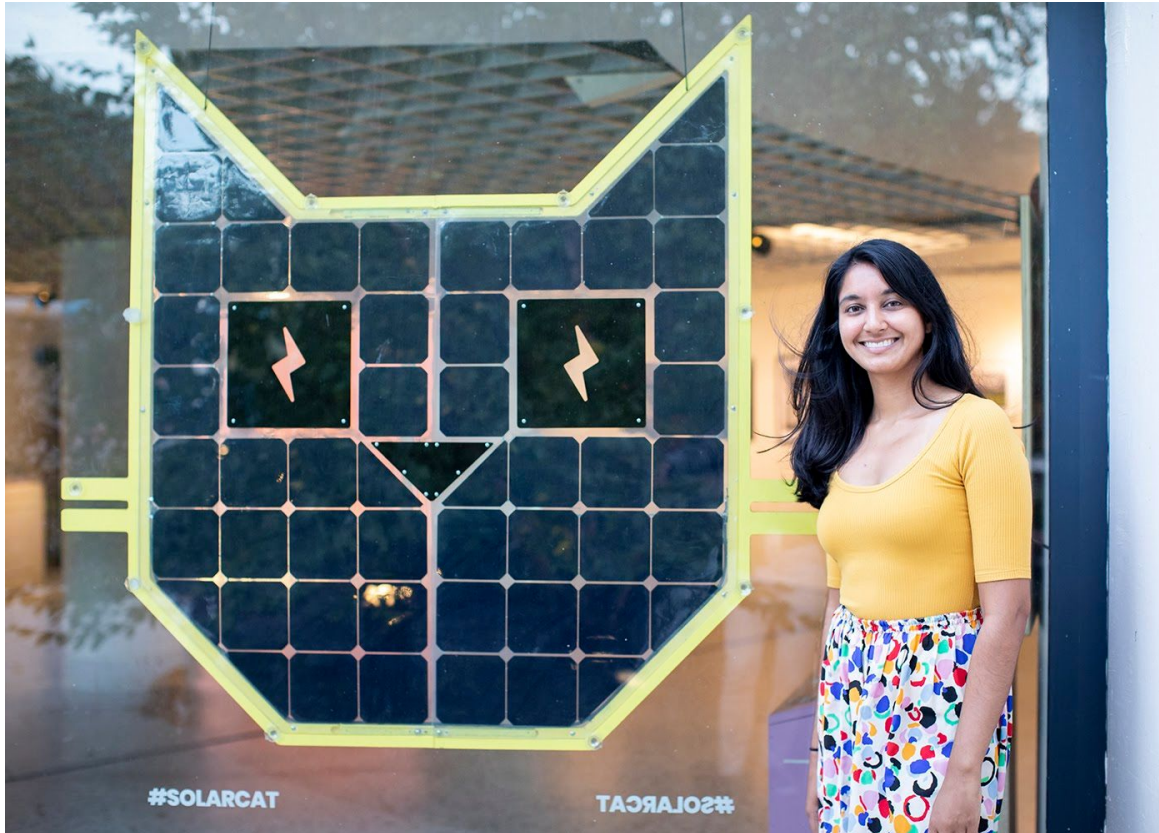


GROUPTHUG

CREATIVE SOLAR SHAPES: THINK OUTSIDE THE RECTANGLE!



TECHNICAL ASSISTANCE DOCUMENT AMERICAN-MADE SOLAR PRIZE, ROUND 4

Unique Challenges:

- **Solar Cell Cutting**
 - Challenge: We need help figuring out how to effectively cut solar cells in different shapes & sizes while optimizing for the most power. We typically work with SunPower™ cells, but because of the backsheet, there are limited ways to cut these. Cutting polycrystalline cells is easier, but they are so fragile!
- **Encapsulation Techniques**

- Challenge: We have been experimenting with encapsulating solar cells in resin & also EVA. Because our solar panels are in such a wide variety of shapes, we are looking for help strategizing the best way to laminate while using the least amount of material. For example, resin allows us to cover custom shapes with exactly the amount of resin needed, but then we need to build a unique frame to pour it in. Whereas with EVA encapsulation, we can use a laminator, but then we end up with a lot of excess EVA cut-offs that feels wasteful.

- **Battery Storage**

- Challenge: Finding the right small-scale battery storage that can be used indoors and outdoors. We have played around with making our own lithium ion configuration, but would prefer to partner with a battery maker since it is not our expertise. The big challenge is that because our creative solar panels range in size, power, and shape - the battery size and MPPT controller would need to be custom every time (leads to the next challenge).

- **Modularity in electronics design**

- Challenge: Our prototype system consists of a custom shaped panel (where the size, power, and shape can change), MPPT controller, and lithium ion battery storage. We need help streamlining and making this configuration more modular so that every time we have a new shape (let's say one cat-shape is 140W and the next sun-shape is 300W) - we don't need to re-design the electronics and battery system every time. In summary, finding a way to scale this customization.

- **Solar Cell Colors**

- Challenge: We have currently been using monocrystalline cells to prototype our designs, but customers have asked us for different color options. We would love help in meeting manufacturers who make or dye solar cells in different colors. Alternatively, we'd love to learn techniques for coloring cells ourselves! We can imagine multi-colored, custom shaped solar panels where they look more like art than solar panels at all.