

Ultralight Portable Solar Tower (UPSaT)

Introduction.

UPSaT is a next generation ultralight 2kW solar tower. It can be thrown in the back of an EV, pulled out by a single person and set up in less than 5 minutes. It fully tracks the sun and provides maximum efficiency power capture for the whole day.

UPSaT incorporates a small, lightweight Solar DC-DC fast charger to directly connect the tower to the EV's NACS port and transferring power at up to 98% efficiency. Depending upon the EV it can recharge up to 50 miles of range per day. And multiple towers can be connected together to provide even greater range.



Solar power production is growing by leaps and bounds. As part of this there is a clear need for portable solar charging for events and off-grid installations. Current portable solar arrays are crude, inefficient, and heavy. None of the existing systems can be easily carried in an EV any distance or set up without significant time and effort.

The UPSaT project showcases the capabilities of the Ion Prototyping Lab (IPL) for design, prototyping and testing. It spans industrial design, mechanical, and electrical engineering, material science, machining, manufacturing, and even software. It also acts as a tool to educate entrepreneurs about the process of developing a new product idea from initial concept through production. Upon completion the UPSaT will be deployed in a number of high profile events in Houston, Texas and around the country to showcase its applications and to promote the Houston hard-tech innovation ecosystem.

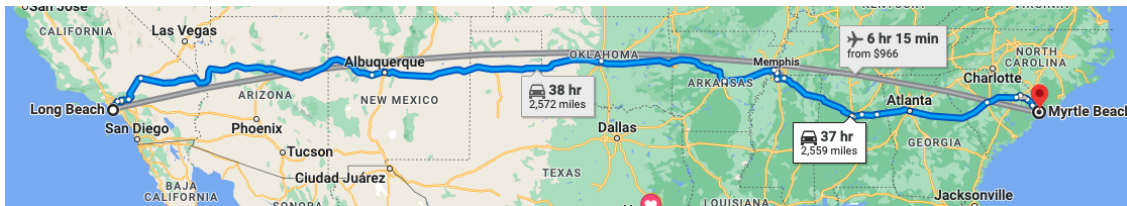
The IPL will document the design, fabrication and incremental testing steps of the UPSaT in a series of educational videos posted on Youtube and other sites. These videos create a platform to inspire individuals and groups to push their limits, learn new things, and take on complex problems in a methodical way. And it further pushes the Ion story to a larger audience.

Events

Once completed the UST will be showcased at a number of events/trips. Below are a few of those events.

Martian Roadtrip

The Martian Road Trip documents the planning and execution of a cross-country road trip in an EV that is recharged **only with solar panels carried with the car**. This trip involves significant engineering optimization of weight, aerodynamics, trip logistics, and overall energy efficiency to minimize charging time and thus trip duration. It pushes the system to prove off-grid self-sufficiency in a novel and highly visible manner.



Burning Man

Burning Man brings together 70,000 people each year in the middle of the desert. There is no infrastructure and all power and facilities have to be brought in. Several thousand portable gas generators are used to power AC, refrigerators, and camp equipment. There is a strong motivation to reduce the significant CO2 emissions from the event. A large portable solar power system would be a great solution, and UST would be brought in to demonstrate the potential.

It is envisioned that the UST would act as a mini central power plant for an encampment of roughly 40 people. It would be configured with a bank of hot-swappable battery modules that could be easily popped out and distributed to the tents in the camp. When a battery runs low it is returned to the trailer and swapped with a new one.

Production

The content will be published as a series of documentary-style YouTube videos released over the course of the project. Each episode would be roughly 30 minutes long and focus on a specific topic (e.g. initial calculations, solar charging, aerodynamics, selecting equipment, trip planning, etc.).

The presentation style for most of the episodes would follow the “approachable technical” discussion format utilized by channels like [Adam Savage's Tested](#) (6.3M viewers), [Project Binky - The Series](#) (2.5M), [Marques Brownlee](#) (17.2M), and various EV/Solar channels like [Out of Spec Motoring](#).

Some episodes would include a stronger technical/educational component talking about the engineering design process and development of specific subsystems ala [NASASpaceflight](#) (796K), [Munro Live](#) (380K), and [EEVblog](#) (913K).

Funding & Sponsorships

The lab will involve a range of sponsors and partners in the productions to provide business & engineering expertise, design input, and funding to cover expenses. These companies will be presented prominently in the videos and on related social media posts.