

### Aircraft Specifications

Wingspan	4.51 m (≈ 15 ft)
Flight Mass	3.3 kg
Wing Area	1.09 m <sup>2</sup>
Cruise Velocity	8 m/s (18 mph)
Stock Flight Time	25 mins
Anticipated Solar Flight Time	≈ 12 hours

### Solar Specifications

	Peak Values 1000 w/m <sup>2</sup>	Actual Values 600 w/m <sup>2</sup>
Peak Voltage	29.37	32.4
Peak Current	5.79 A	2.32 A
Peak Power	169 W	75 W
Efficiency	23.1%	

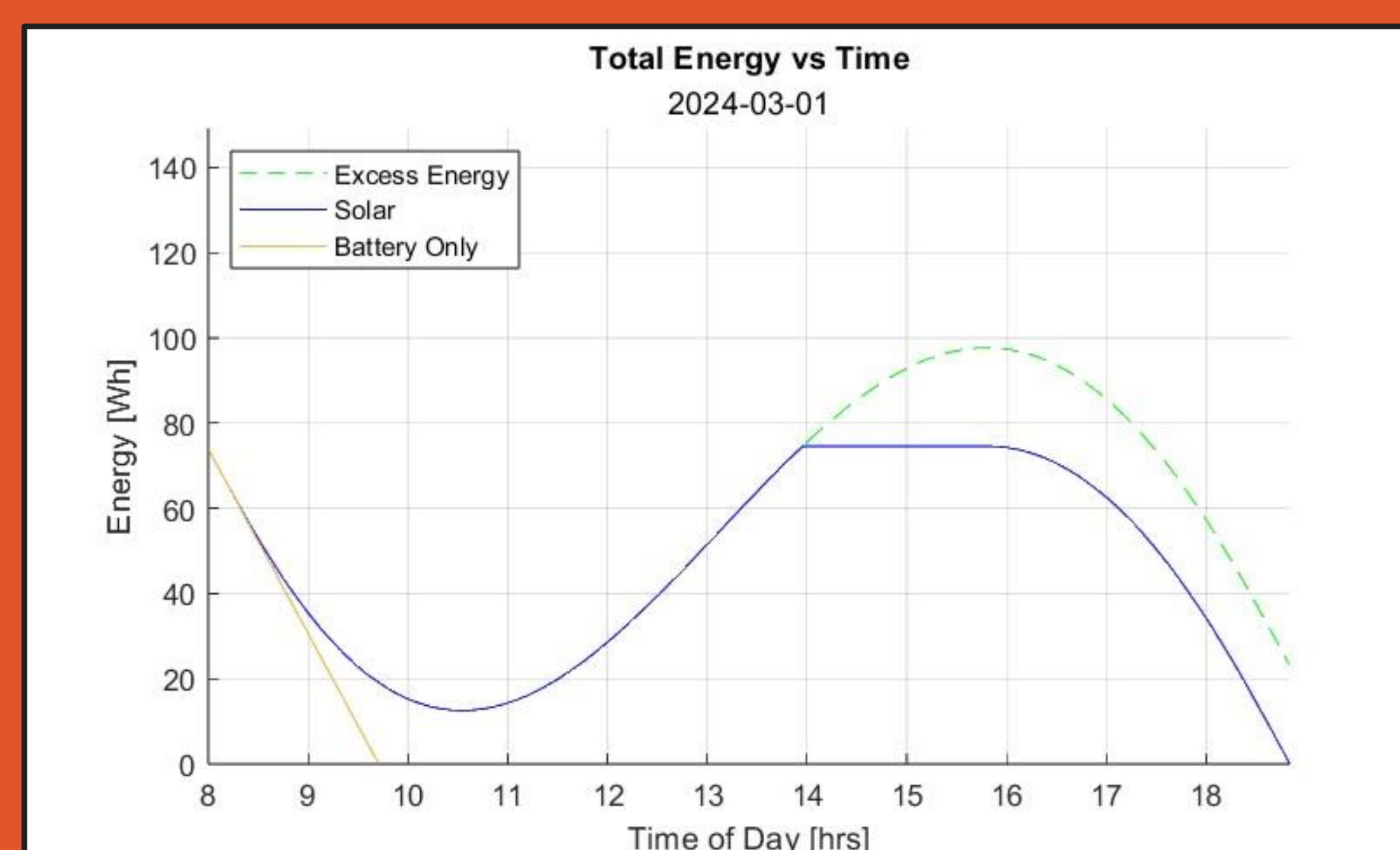


Fig 4: A MATLAB model was used to determine characteristics of the final aircraft and predict performance. Provided is a plot to predict flight on a certain day based off historical solar data.



# SOLAR AIRPLANE

## TEAM OVERVIEW

The 2023-2024 OSU Solar Airplane team is a capstone team made of 8 capstone members and 3 active volunteers. This is the second year of the project at OSU, and this year's team is proud to continue the legacy and progress made by last year's team.



Fig 1: Final configuration of aircraft (left) and aircraft test flight (right)

## MISSION OVERVIEW

**Goal:** extend the flight time of a hobby-scale aircraft from 25 minutes to 12 hours

**Approach:**

- Integrated solar system to maximize efficient energy capture
- Propeller efficiency optimization
- Autopilot for data logging and reduced pilot workload for long endurance flights
- Wing extensions to increase aspect ratio and available space for solar panels

## AIRCRAFT OVERVIEW

- **Solar System** - Provides constant power to charge batteries, operate motor & avionics system. Efficiency and fluctuations managed by two maximum power point trackers (MPPTs).
- **Pitot Tube** - Measures airspeed. Allows for more efficient aircraft operations, data collection, and improved model predictions.
- **Wing Extension** - Increasing wingspan allows for more solar panels and reduces complexity of building new wing. Practical solution improves aerodynamics, more power gen. & flight time.
- **Semi Autonomous Flight** - A semi-autonomous flight control system is integrated to provide active stabilization and reduce pilot workload. System holds altitude, airspeed, and heading.
- **Folding Propeller** - Increases gliding efficiency and enables belly landings. The motor controller stops the motor and freestream air naturally folds the propeller blades against the fuselage.

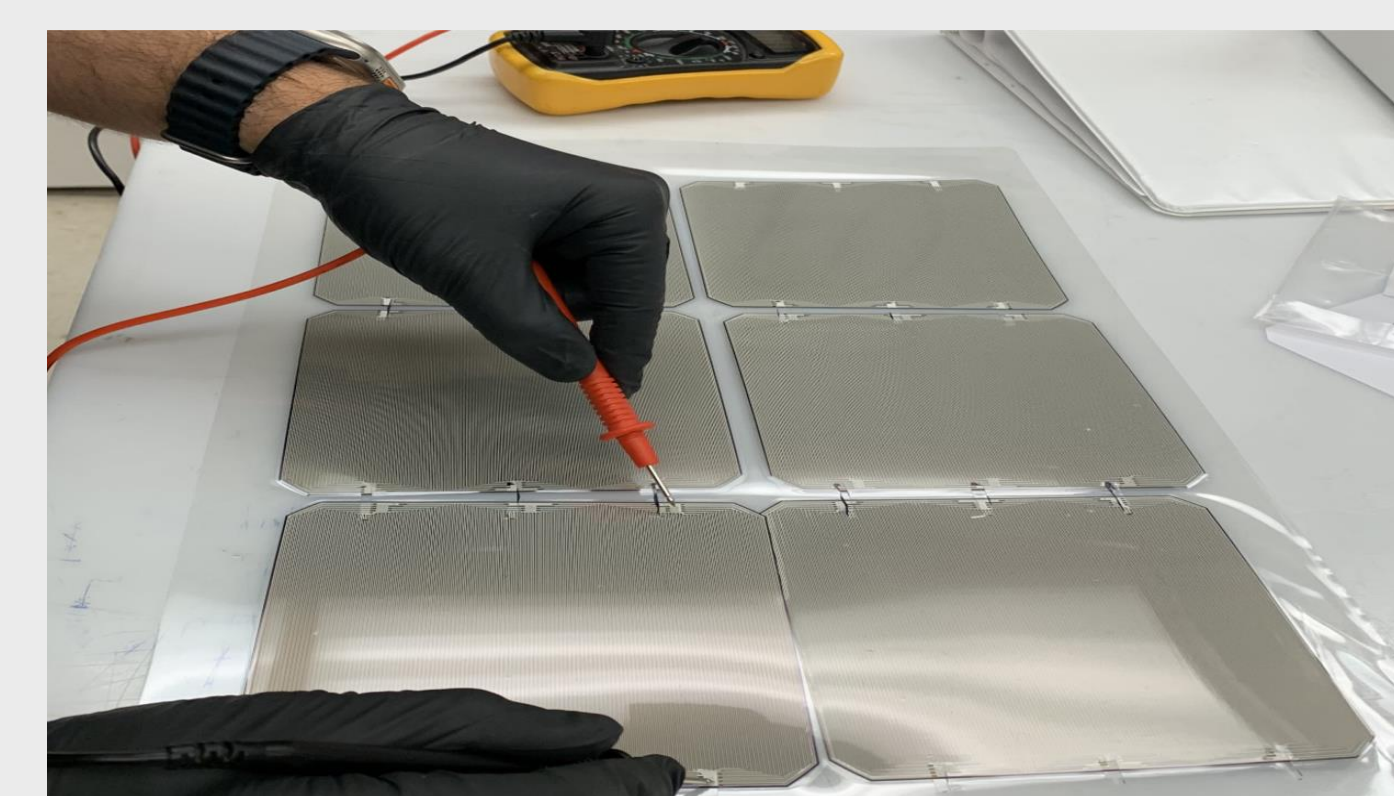


Fig 2: Fabricating and testing solar panels

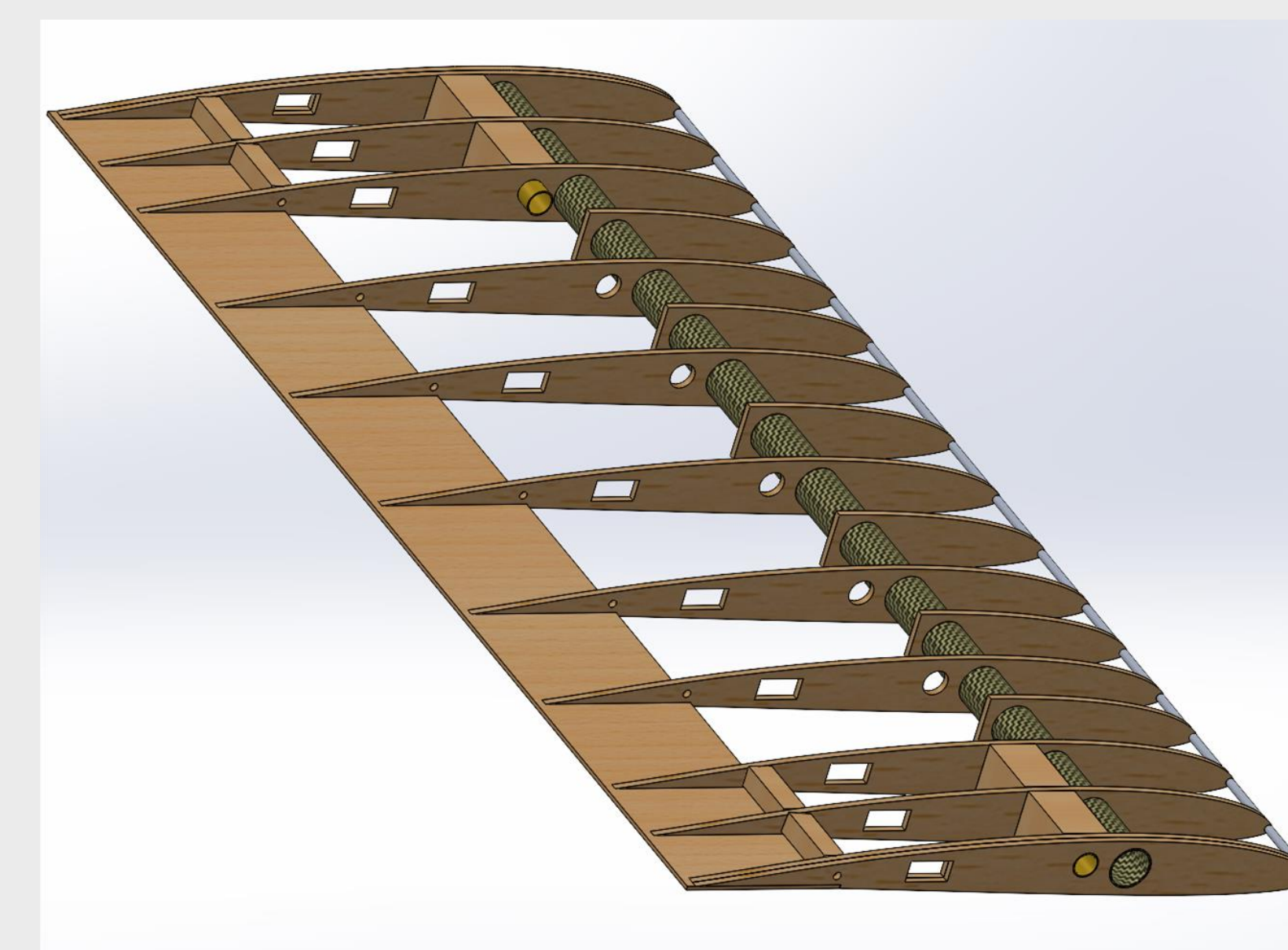
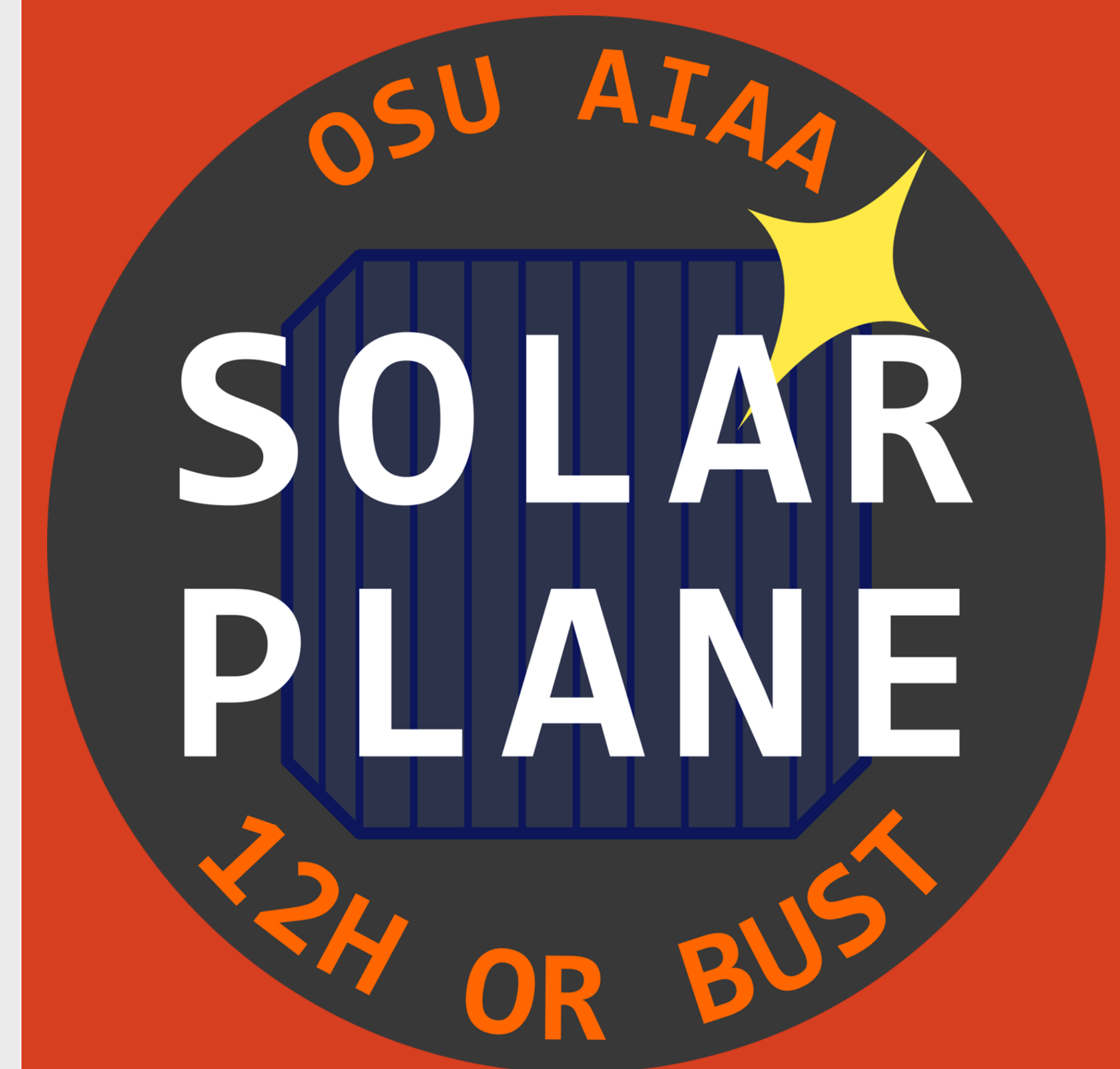


Fig 3: CAD model of Wing Extension

### SOLAR AIRPLANE 2023-2024



### PROJECT SPONSORS



### Technical Advisor

Dr. Roberto Albertani

### Pilot

Dave Patana

### Course Instructor

Prof. John Greeven