



Solar Powered Airplane

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Goal

Our team is attempting to build a remote controlled aircraft powered by solar cells. We hope to use solar power to produce run times significantly better than those of traditional, battery-powered aircraft.

Background

The purpose of this project is to design an aircraft that integrates solar cells into design for sustained flight. Transportation accounted for more than one third of CO₂ emissions, and fossil fuel consumption continues to increase globally so alternatives fuels would have a tremendous impact on the environment.

Many engineers hope to create an airplane that is powered with solar powered, but solar cells were too heavy and inefficient to make this goal plausible. With new developments in the semiconductor industry, new solar cells offer promise for applications that were previously not possible such as the NASA Helios, an aircraft meant to stay aloft indefinitely under purely solar power.

Applications for solar powered airplanes range from long term aerial surveillance to planning for construction and monitoring crops. In more recent years, advanced solar cells have become more accessible to the common consumer. With this project, we hope to use newly available technologies to create a smaller scale solar powered aircraft.

Team Members

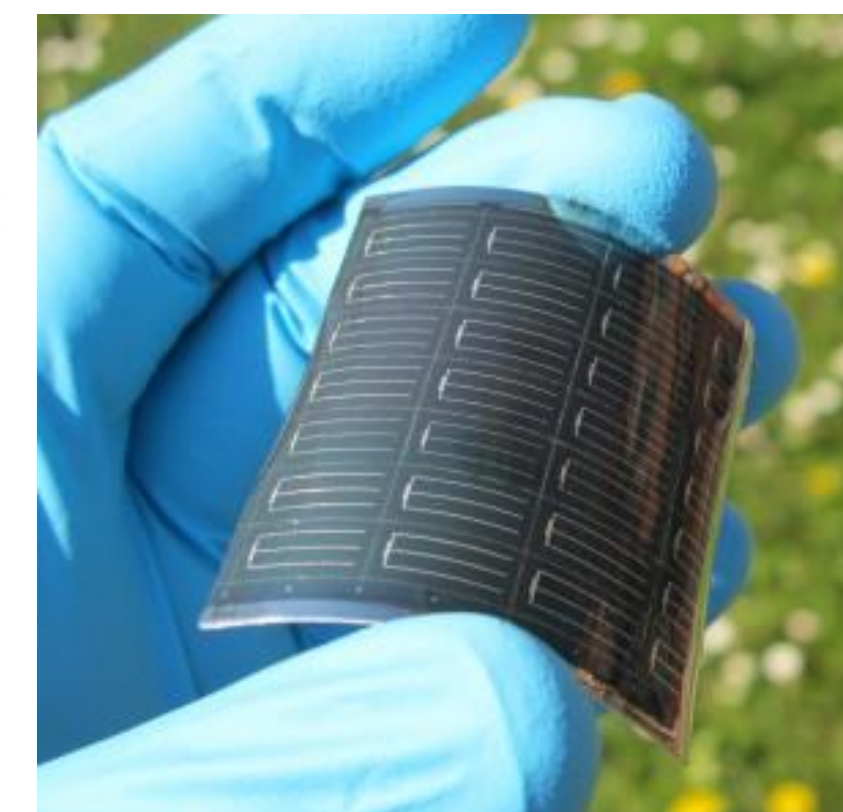
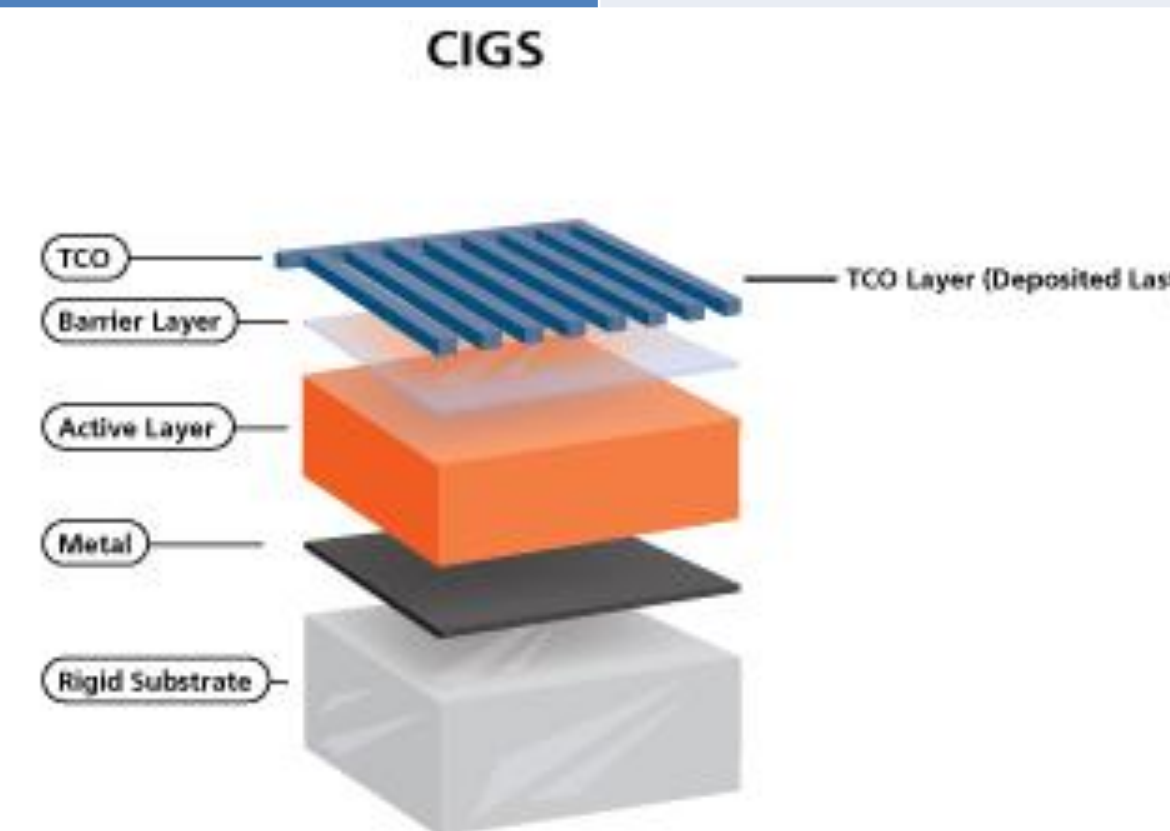
Member / Major	Subteam Responsibilities
• Alvin Cao / ME & MSE	• Solar cell and airfoils research, poster
• Joseph Cuevas / ME & MSE	• Solar cell research, fuselage design
• Christopher Gay / ME & MSE	• Team leader, components and overall design research
• Kenny Miranda / ME & MSE	• Materials and dihedrals research
• Jonathan Wong / ME & MSE	• Materials research, poster

CIGS Solar Cells

• Voltage	• 18.5V
• Current	• 243mA (0.234A)
• Voltage (oc)	• 25.5V
• Current (sc)	• 295mA (0.295A)
• Power Output	• 4.5 [W] → .00769 [W/cm ²]
• Total Size	• (170 x 344mm)
• Weight	• (105 g) → .180 [g/cm ²]
• Price	• \$40.00 ea → 0.0684 [\$ /cm ²]
• Efficiency	• ~20%

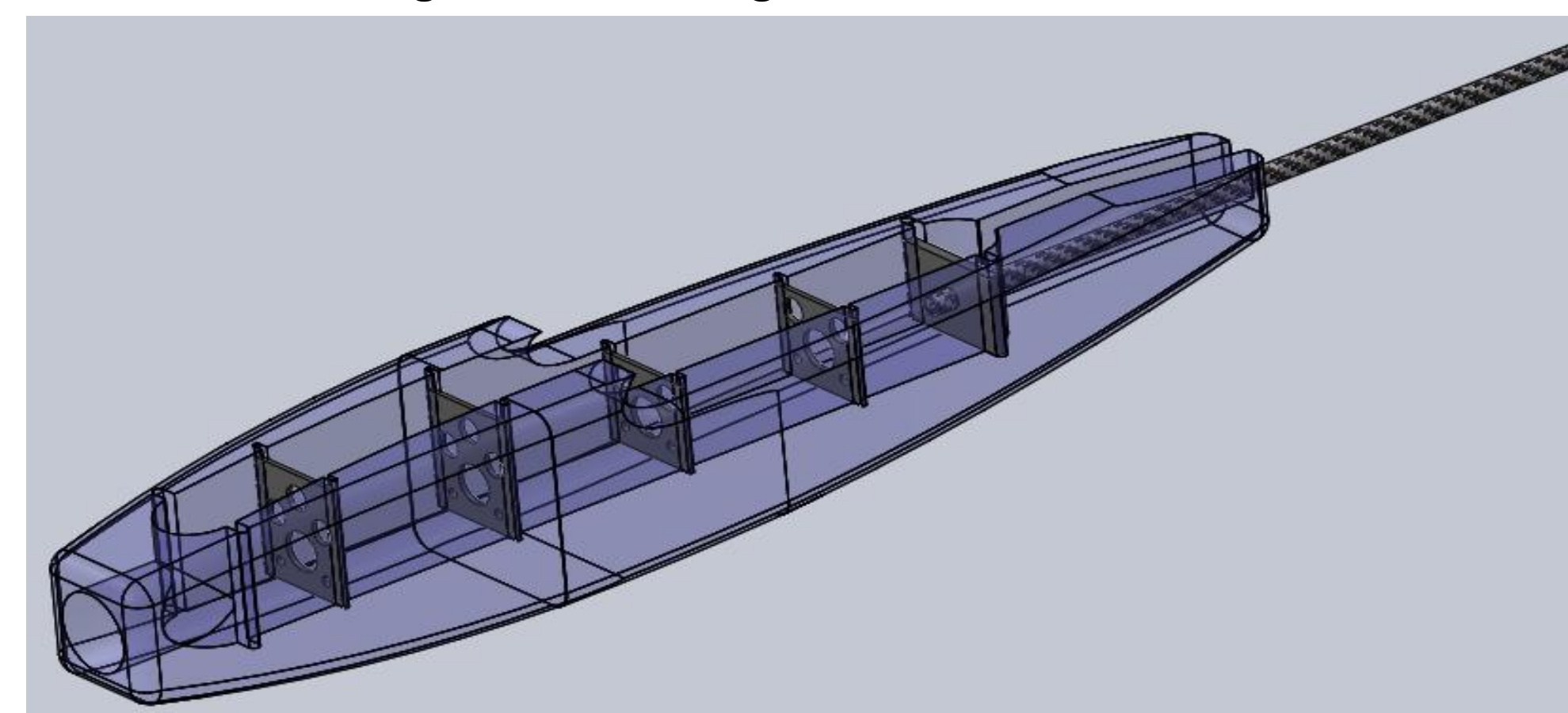
Pros:
 Completely flexible
 Easy to connect
 Inexpensive
 Direct exposure to sunlight; don't need to rely on transparent film

Cons:
 Moderately heavy
 Does not come in smaller sizes



Fuselage

Our preliminary fuselage design incorporates a streamlined teardrop shape in an attempt to minimize drag. The carbon fiber boom used to support the tail wings will be a low profile, low weight, high strength alternative to having a foam fuselage that extends to the end.



Materials and Estimated Cost

The following table sums up the most important materials we will need for the project and their costs (including tax and shipping):

Item	Cost (USD)
Hitec Optic 6 Radio Transmitter and Receiver System	\$240
(2) Hitec HS-85MG+ Servos	\$75
Himax HG2025 Inrunner Brushless Motor	\$75
Castle Creations Phoenix 25 Electronic Speed Controller	\$90
Thunder Power TP13003SPP45 Battery	\$45
Thunder Power TP610C Lithium Battery Charger (for testing and ground use)	\$140
Thunder Power TP425C light Lithium Charger (to be dismantled for onboard battery charging circuit)	\$70
(22) WaveSol Mobile (EIPV Module) – WSME-0045 Solar Cells	\$880
Hangar 9 Heat Gun (for shrinking films onto the plane)	\$30
Weller 80W Soldering Iron (for connecting solar cells and making in field repairs)	\$50
5 Minute Epoxy (for securing major joints and making in field repairs)	\$50
Insta-Cure Cyanoacrylate Glue (fast and minor repairs)	\$20
Mylar film rolls	\$50
Polystyrene blocks	\$50
Carbon fiber rods	\$70
Fiber reinforced Nylon sheets	\$400

Progress and Future Work

Fall 2012: Project definition, planning, budget
 Initial research for design and materials selection
 Submit project to UROP, Fall Design Review

Winter 2013: Detailed design & Implementation plan, revised budget
 Initial prototype, initial test, update design approach
 E-Week BBQ & Senior Display

Spring 2013: Design Revision, Final Prototype & Demonstration
 Final Design Review & Symposium

Contact Information

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