Solar Airplane 2020-2021

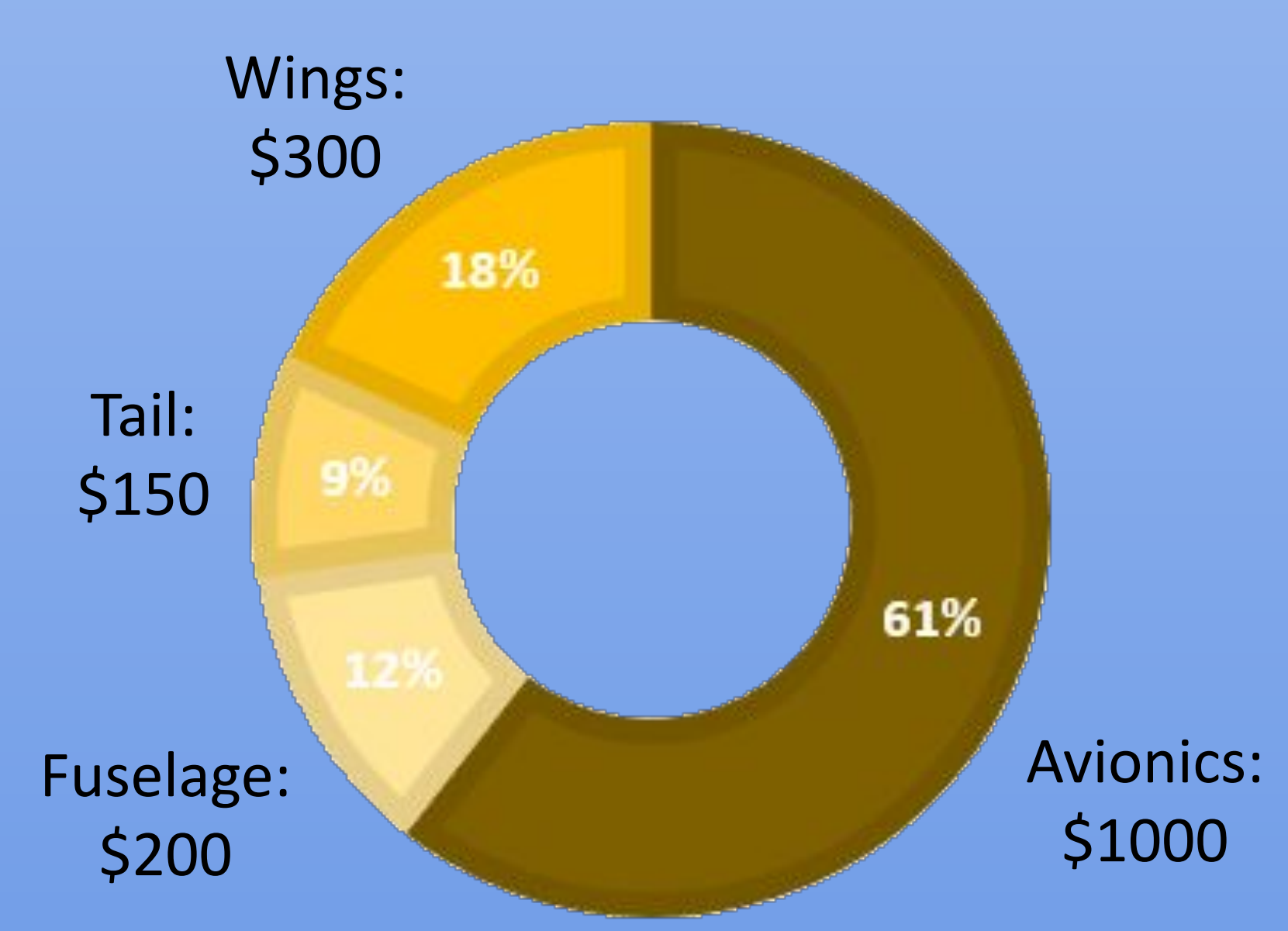Faculty Advisor: Professor Yun Wang

Background

Solar Airplane aims to create a UAV that utilizes solar cells to extend flight time. A modular payload bay will be incorporated so the aircraft may be used in multiple different use-cases, such as search-and-rescue, payload drop delivery, and surveillance of a large area.

Goals & Objectives

· To provide students an understanding of integrated systems, airplane design, prototyping and manufacture
· Aim to increase the flight time of our UAV by integrating solar panels and minimizing mechanical losses
· This quarter's objectives were to research the components of a UAV, create a design utilizing Solidworks, run stress anaylisis on components, and create models on electrical components
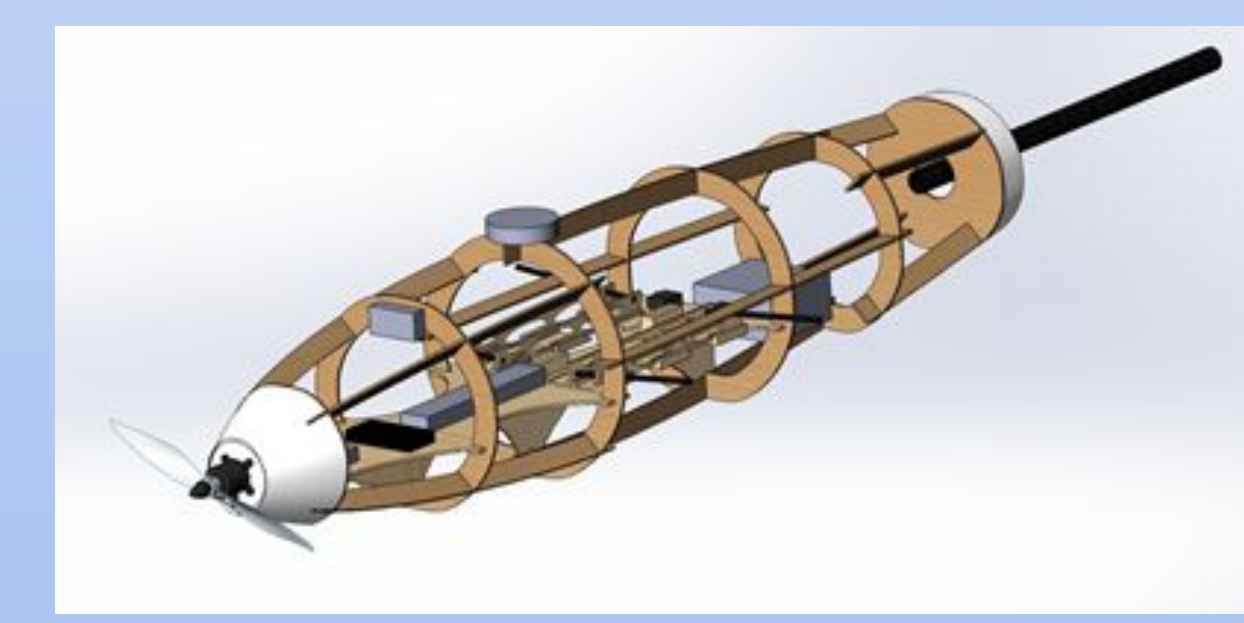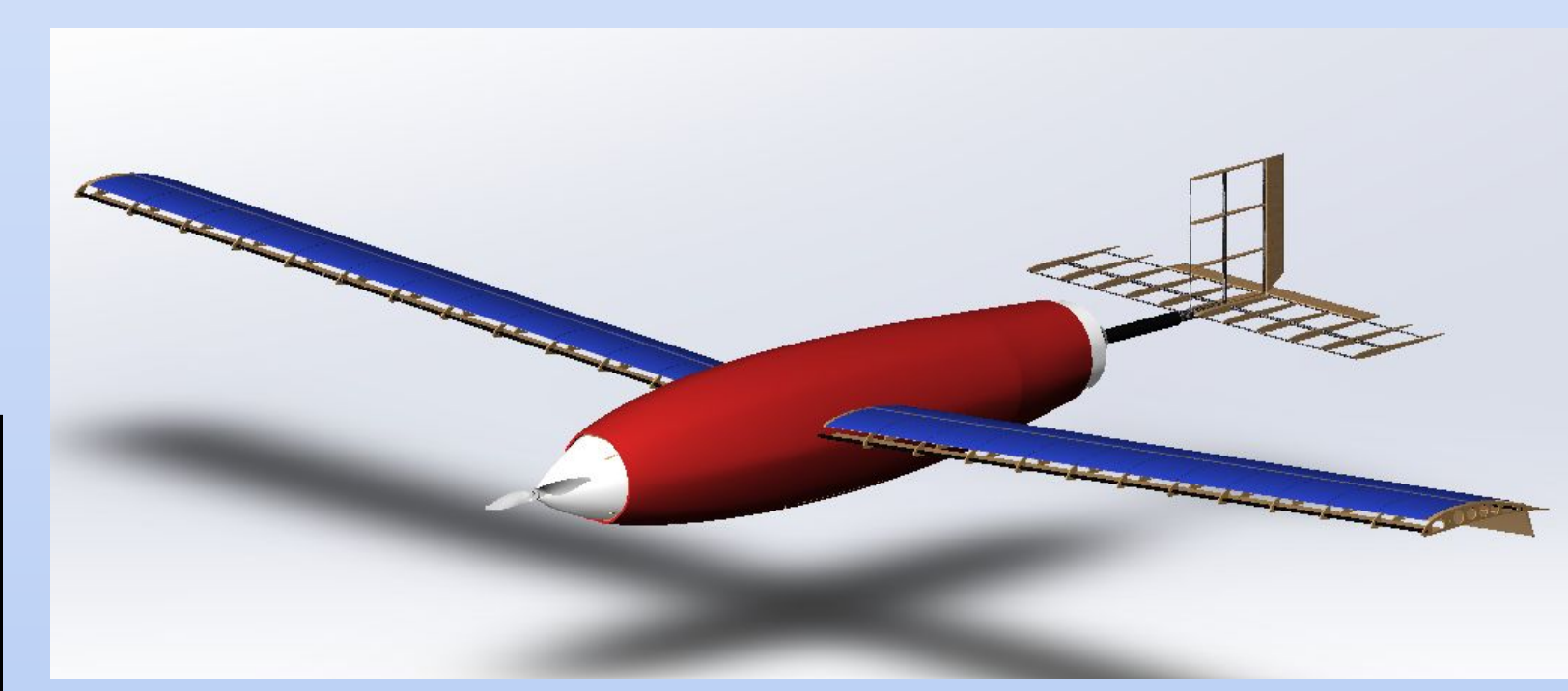
Budget 2020-2021

Wings: $300 — 18%
Tail: $150 — 9%
Fuselage: $200 — 12%
Avionics: $1000 — 61%

Current Status

· First revision of CAD completed
· Characterization of aircraft using Excel
· Components selected

Aircraft Specifications

Weight	6 lbs.
Payload Capacity	0.5 lbs.
Wingspan	10 ft.
Wing Loading	0.9 oz/ft^2
Total Length	6 ft.
Expected Power Consumption	150 watts
Expected Power Generation	117 watts
Solar Cells:	Sunpower C60 (*44)

Aircraft Wiring Diagram

Component Location Key
- Fuselage
- Wings
- Nose/Front Fuselage
- Exterior Fuselage
- Flight Surfaces

Solar Cell (x21), Left Wing, MPPT Module, Li-Ion BMS, Li-ion Battery, MPPT Module, Solar Cell (x21), Right Wing, Telemetry Modem, Serial Receiver, Servomotor (x4), Video Transmitter, Analog FPV camera, PIXHAWK Flight Controller, GPS module, ESC, Brushless Motor, Current Sensor

Projected Timeline

Fall → **Winter** → **Spring**

Fall: Research, design, of electrical and aero components. Stress analysis of the structures.

Winter: Component testing and verification, manufacturing.

Spring: Finish manufacturing. Flight testing, performance analysis and design modifications.
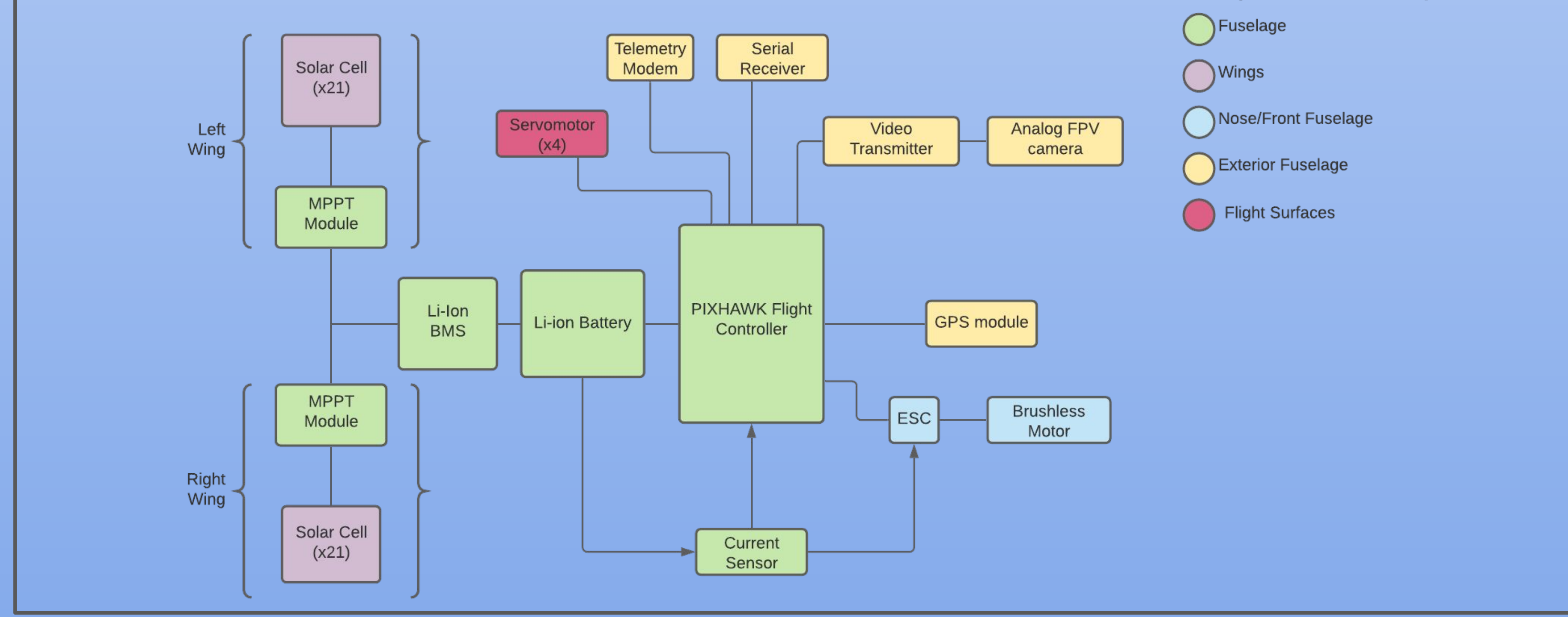
Requirements

· Multipurpose aircraft
· Must be able to fly in 20 mph winds
· Solar cells supplement battery power
· Extension of 30 minutes beyond the "battery-alone" duration
· GPS and camera integration
· Aircraft should be portable and fit within a small car (max. component length 6ft)
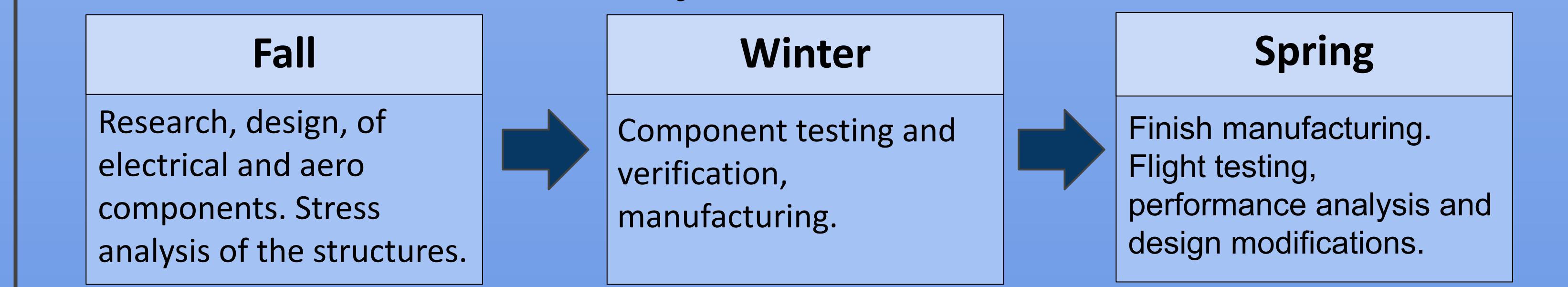· In-flight data received via remote terminal

Next Steps

· Characterize MPPT, battery charging cycles, develop most efficient flight plan
· Assemble entire plane, install components
· Prepare for first flight test in beginning of spring. Revise design if performance does not meet requirement.

Team Members

Project Manager: Andre Necochea

Avionics Lead: Preston Sterling
Ariel Rivera
Chi Hsuan Miao
Dhruv Khanna
Elise Jones
Ethan Leong
Ezequiel Amador-Oorona
Freddy Gomez
Hafsah Arain

Fuselage Lead: Alexander Tobey
Bhumi Tandel
Dylan Luu
Joseph Wood
Keely Hsieh
Hansel Yani
Nicolas Handoko
Noah Prochnow
Octavio Altamirano
Patrick Turpin
Quang Vu Ly
Uran Berisha

Wings Lead: Tyler Ong
Danny Tran
Darshan Donawala
Jainam Hitesh Vasa
Malcolm Overbaugh
Matthews Cribioli
Sary Aranki
Yuji Morita

Tail Lead: Gabriel Nicklaus
Jeremy Pate
Mathias Kasendar
Omid Souri
Shaw Chiou
Thaddeus Tan

For further inquiry, contact:

Project Manager:	Andre Necochea	anecoche@uci.edu
Wing Lead:	Tyler Ong	ongtd@uci.edu
Fuselage Lead:	Alexander Tobey	atobey@uci.edu
Tail Lead:	Gabriel Nicklaus	gnicklau@uci.edu
Avionics Lead:	Preston Sterling	pbsterli@uci.edu