☀ Solar Airplane 2018-2019 ☀

Faculty Adviser: Professor Yun Wang
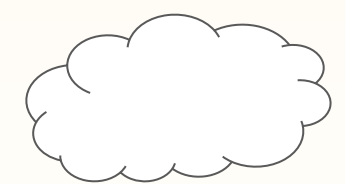
SAMUELI SCHOOL OF ENGINEERING
UNIVERSITY of CALIFORNIA · IRVINE
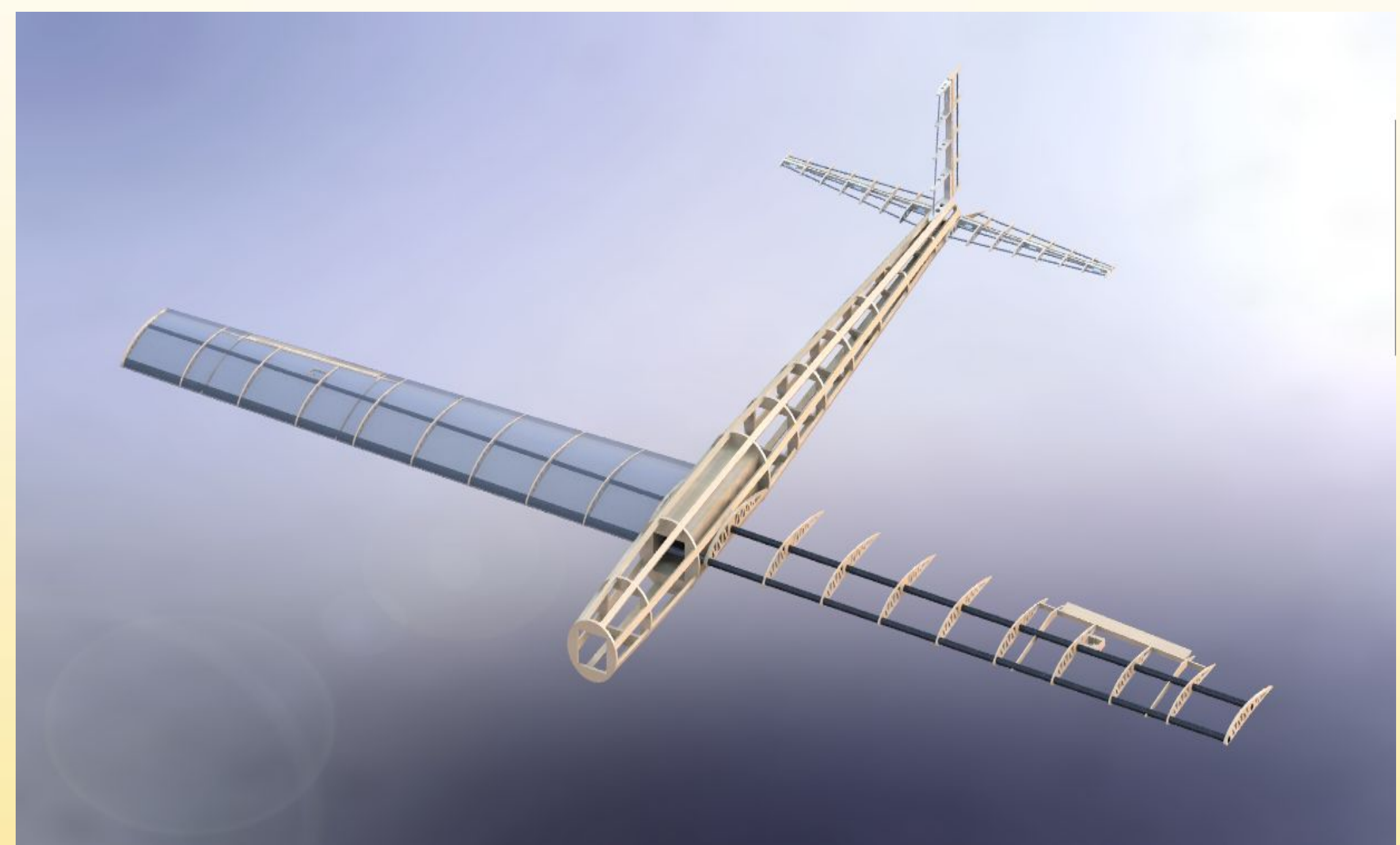
Background

- The purpose of this project is to solve a design challenge given by the advisor involving integration of solar panels
- This includes the design, manufacture, and optimization of a fully functional unmanned aviation vehicle (UAV)

Goals and Objectives

- Provide students an understanding of integrated systems and aeroplane design and manufacture
- Aim to increase the flight time of our UAV by integrating solar panels and minimizing mechanical/electrical losses

Team Formation

For further inquiry, contact:

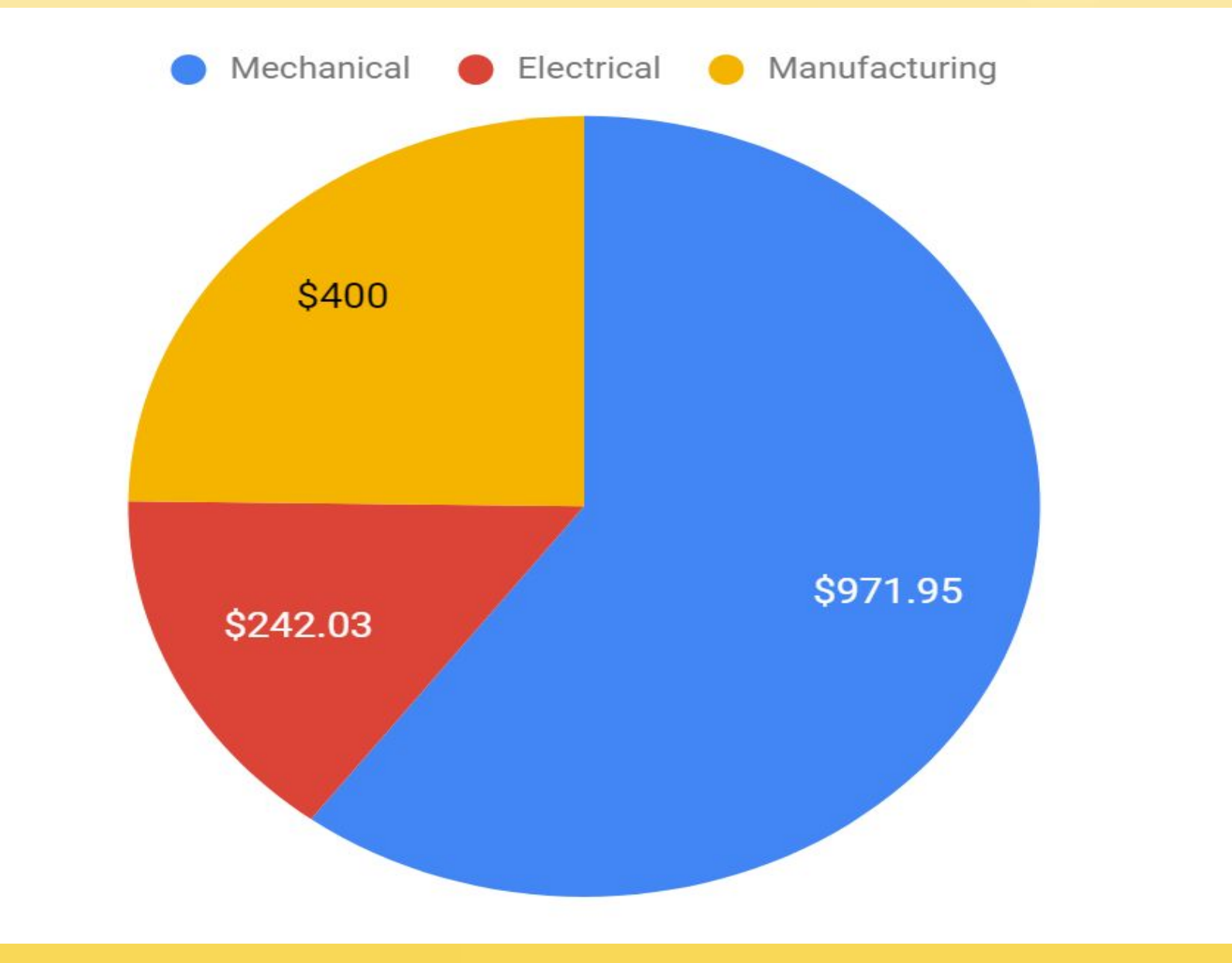|	
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Preliminary Solidworks Model

- Wings will be ribbed and strung with carbon fiber rods
- Wings will aim to have solar panels near the surface
- Fuselage will be paneled in some segments, and monokoted in others
- Tail will be ribbed and strung like the wings
- Servos will be fitted near aileron, elevators, and rudder and wired to the fuselage

Avionics System Block Diagram

- **Innovation:** Solar power augmentation allows for longer flight time
- Solar panels are integrated onto the plane itself and collect solar energy from the sun
- Solar energy then supplements the main battery that powers the airplane
- The motor and servos that control the ailerons, elevators, and rudder, are powered by the main battery

Timeline

Fall
Research, design, and simulation of electrical and aero components

Winter
Stress analysis, component testing, manufacturing

Spring
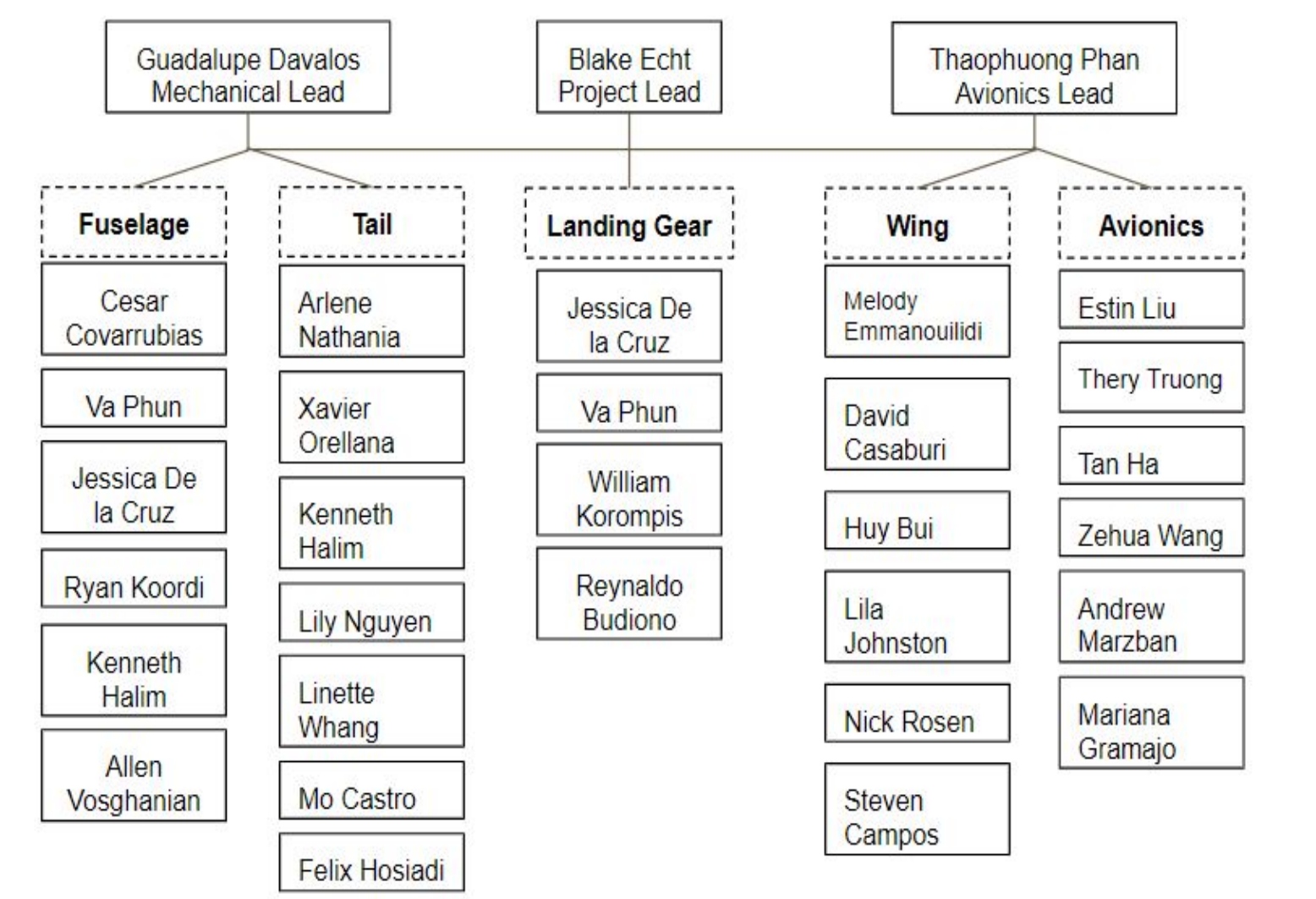Flight testing, performance analysis and design modifications

Requirements

- Maximum UAV weight of 12 pounds
- Maximum UAV dimensions are 24 square feet
- Technical payload of 2 pounds
- Minimum flight time of 10 minutes
- Solar panels must extend flight time by a minimum of 15%
- Must fly at an altitude between 456 to 700 feet above sea level
- Must have 2 control systems that respond to environmental or operating conditions
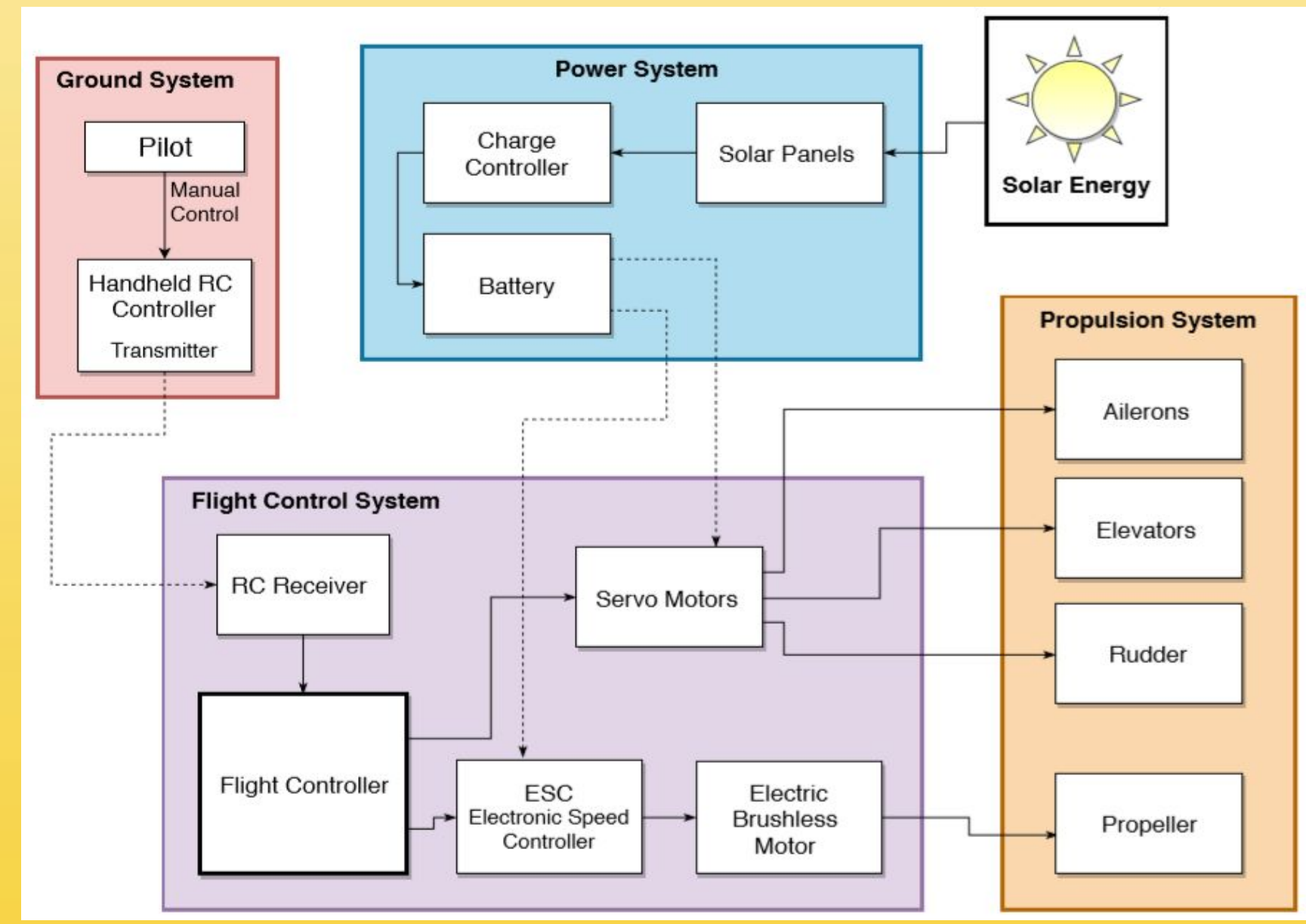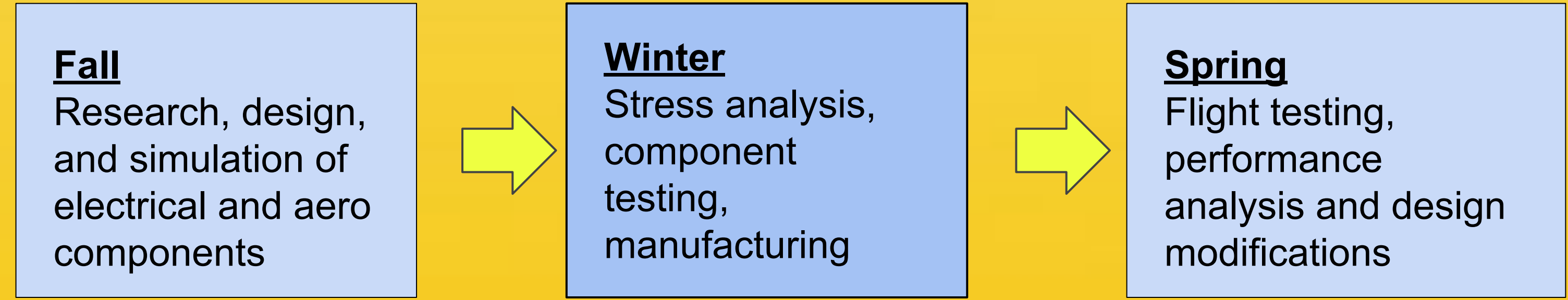- One component must be made of carbon fiber

Winter Quarter Budget

- Mechanical
- Electrical
- Manufacturing

$400
$242.03
$971.95

Next Steps

- Integrate the wings and tails onto the fuselage
- Integrate electronics inside the fuselage
- Build a second set of wings to test solar panel efficiency
- After successful flight, the final step is to optimize the airplane to reduce mechanical and electrical loses

Project Message

1. **Background** – provide introduction and context for the project
2. **Goal and Objectives** – describe the purpose (what are you trying to achieve). List objectives that support the goal
3. **Requirements** – short summary of the requirements for your project
4. **Innovation** – highlight the new, inspiring, creative methods, ideas, concepts, and/or designs for your project (what you want people to notice)
5. **Current Status** – show the progress you've made and the current status of the project
6. **Next Steps** – show what you intend to do to complete your goal and objectives
7. **The Bigger Picture** – describe the business, competitive, economic, environmental, social, scientific, and/or academic impact and significance for your project

Note: Text should be used sparingly and combined visuals (images, graphs, etc.) to tell the story.

Project Details

The following complements the project's message and should be organized with the content with good structure and sequence.

1. **Title** – provide the title for the project (should be the dominant text on the poster)
2. **Team Members** – list the team members of the project. For larger groups, include organization chart with sub-team responsibilities. Include team picture.
3. **Advisor(s)** – list the advisor(s) for your project
4. **Timeline** – show a simple, straightforward schedule with major milestones
5. **Budget** – provide the budget estimate for your project
6. **Logo** – provide the logo for your team if you have one
7. **Contact Information** – provide contact information, website if you have one, for those seeking to learn more about the project

Poster Checklist

Basics

❑ Title and other required sections are present

❑ Team members and contact information is included

❑ The poster conforms to the requirements 24" x 36" (landscape) format with a 0.25" solid border around the poster

❑ Font is sans-serif

❑ Font is consistent throughout

❑ Spelling is correct throughout

❑ Grammar is correct throughout

❑ Acronyms are defined on first use

❑ Content is appropriate and relevant for audience

Layout

❑ All text can be easily read from 3-5 feet away

❑ Flow of the poster is easy to follow

❑ White space used well

❑ Section titles are used consistently

❑ Images and graphics are used in place of text whenever possible

❑ Bullet points and lists are used in place of text whenever possible

❑ All images are relevant and necessary to the poster

❑ Charts are correct – i.e. appropriate type for data, data is correct and correctly represented

❑ Text color and background color are significant in contrast for easy reading

❑ Background color doesn't obscure or dim text

Content

❑ The message and story of the poster is clear

❑ Title is clear and informative of the project

❑ Goal and objectives are identified and explained

❑ Current status is shown

❑ Next steps are described

❑ The big picture is presented

❑ All content is relevant and on the key points of the message

❑ Content is not duplicated in text and graphics