Fall 2020 Design Review

Tensegrity Wing

UCI Samueli School of Engineering

Background

- Changing airfoil shape mid-flight will increase aerodynamic efficiency during different flight sections (liftoff, cruise, landing)
- The morphing wing proposes a more fuel efficient and environment friendly wing
- A more efficient wing design will reduce the amount of thrust needed to maintain the aircraft, reducing fuel consumption and cost of flight

Goals and Objectives

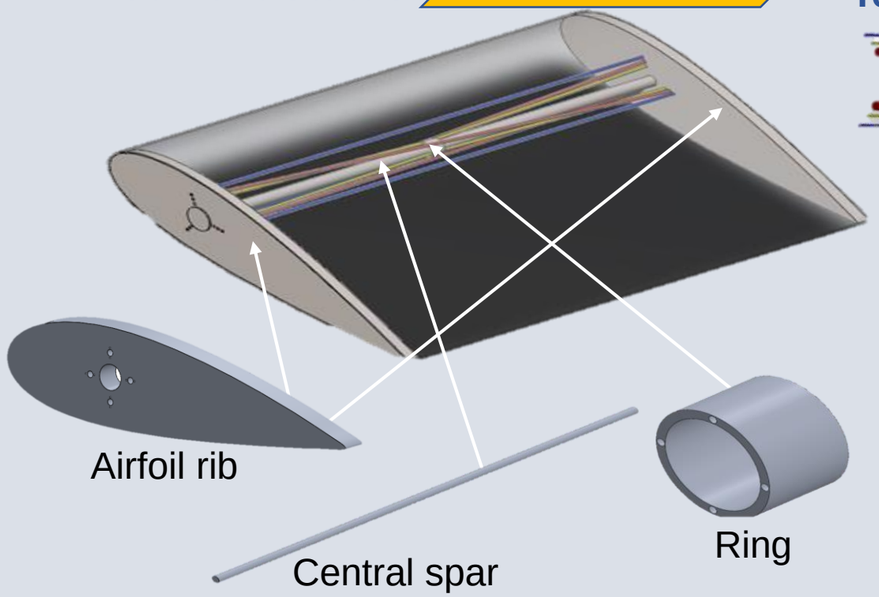
Design, fabricate, and test a morphing wing utilizing an inner tensegrity mechanism.

Fall	**Research into favorable airfoil for the wing based on FEA and CFD simulations.**
Winter	**Finalize design of prototype with optimized internal mechanism.**
Spring	**Wing prototype finalized with tensegrity mechanism and verification of data.**

Requirements

- Capable of maintaining ***optimal aerodynamic efficiency*** by twisting individual airfoils to adjust for changes in lift and drag
- ***No discontinuities*** present on the surface of the wing
- The morphing wing and the inner tensegrity mechanism combined would be ***lighter than traditional wing design***

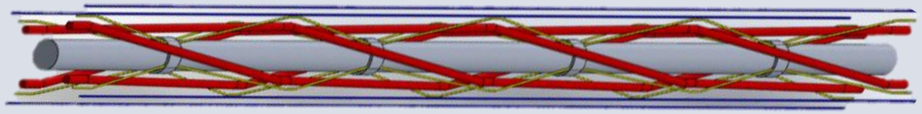
Current Status



Team

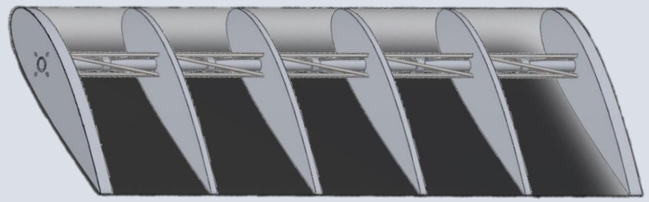
Advisor: Edwin A. Peraza Hernandez	
Team Lead: Oscar A. Verdugo	
Subteams	
Structures	**Fluids**
Vladimir Perez-Bonilla	Ali Haroon
Joel Venegas	Nicholas Federizo-Jimenez
Kimberly Martinez	Linda Chea
Kajohn Aguilar	Raphael Feliciano

Tensegrity Mechanism



- Twisting of the wing will be conducted by an inner tensegrity mechanism
- Three types of wires will be included in the mechanism, which are:
  - *Stabilizer wires (Yellow)*
  - *Longitudinal wires (Blue)*
  - *Actuator wires (Red)*

SolidWorks & CFD



- Preliminary CAD model of the morphing wing with inner tensegrity mechanism created using SolidWorks

- Analysis of aerodynamic performance at different twist angles was done using ANSYS

Bigger Picture