Fall 2019 Design Review

TENSEGRITY WING

UCI Samueli School of Engineering

Background

Control surfaces such as ailerons, elevators, and rudders on planes cause drag. The morphing wing proposes a more environment friendly and fuel efficient wing.

Goal and Objectives

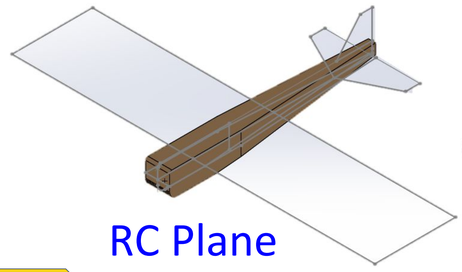
Design, fabricate, and test first morphing wing plane at UCI utilizing a torsional mechanism

Fall	• Design CAD models for wing and RC body
Winter	• Fabrication of wing and body • Wind tunnel tests
Spring	• Flight testing and redesign

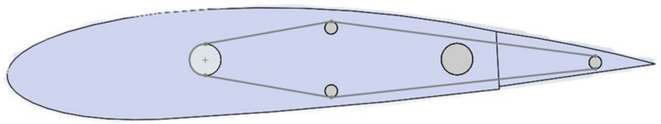
Requirements

- Capable of generating increased lift by bending “flaps” of wing as compared to traditional aircraft wings
- Zero control surfaces
- Flexible lightweight skin < 1lb
- Light weight components for inner structure of wing < 2 lbs
- Wing is capable of being housed in a flight capable RC plane
- Entire plane < 7 lbs

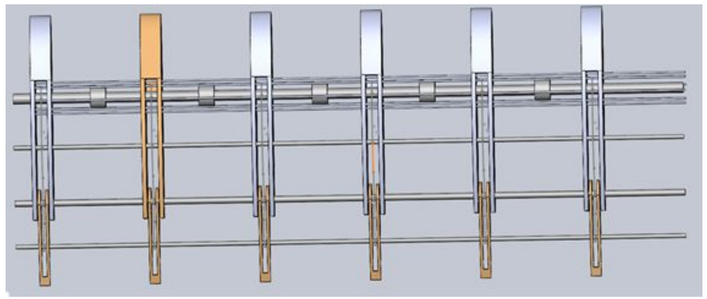
Current Status



RC Plane Body



Wing Pulley System



Inner Wing Structure Assembly

Team

Advisor: Edwin A. Peraza Hernandez		
Team Lead: Taajza Singleton		
Subteams		
RC Plane Body	**Morphing Wing**	**Wind Tunnel**
Taajza S. **Danny T.** **Diana Q.**	**Edgar H.** **Mingqing Y.** **Spencer L.**	**Ernesto G.** **Joshua F.** **Leonardo J.**

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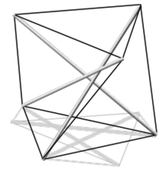
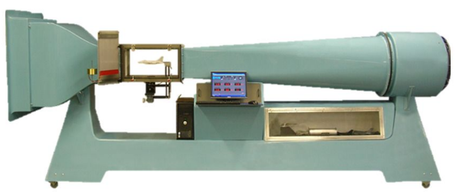
Innovation

- Tensegrity utilizes adjustable tension among one-dimensional interacting members in order to create different three-dimensional structures



Next Steps

- Fabricate RC plane body and wing
- Conduct wind tunnel tests of different 3D printed airfoils



The Bigger Picture

- Changing airfoil shape mid-flight will produce more lift/drag depending on flight section (liftoff, cruise, landing)
- More efficient flight will reduce engine thrust required to provide additional lift
- Less engine thrust reduces cost of flight and reduces environmental impact
- Can be applied to small aircraft or UAV (unmanned aerial vehicle)