Winter 2020 Design Review

TENSEGRITY WING

UCI Samueli School of Engineering

Background

- The morphing wing proposes a more environment friendly and fuel efficient wing.
- 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 for take-off
- Less engine thrust means less fuel used, cost of flight, and reduces environmental impact

Goal and Objectives

Design, fabricate, and test a morphing wing utilizing torsional mechanism

Fall	• Design CAD models for wing
Winter	• ANSYS simulations on all CAD model designs • Fabrication of wing
Spring	• Conduct wind tunnel tests of our tensegrity wing design

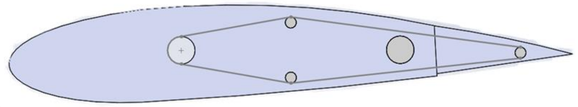
Requirements

- Capable of increasing lift by bending tail of wing as opposed to flaps, and elevators on a traditional wing
- Zero control surfaces
- Flexible lightweight skin << 1lb
- Light weight components for inner structure of wing < 1.5 lbs

Current Status

Materials needed: balsa wood, maple rods, servo motor, Prusa i3 MKS3 3d printer, kite string, latex skin, polycarbonate sheets

Wing Pulley System



Section view of wing pulley mechanism

Combined set-up

Inner Wing Structure Assembly

Team

Advisor: Edwin A. Peraza Hernandez		
Team Lead: Robert Rowe		
Subteams		
Aerodynamics	**3D Printing**	**Wind Tunnel**
Edgar H. **Matthew O.** **Pedro S.**	**Spencer L.** **Danny T.** **Heriberto G.**	**Robert R.** **Diana Q.** **Taajza S.**

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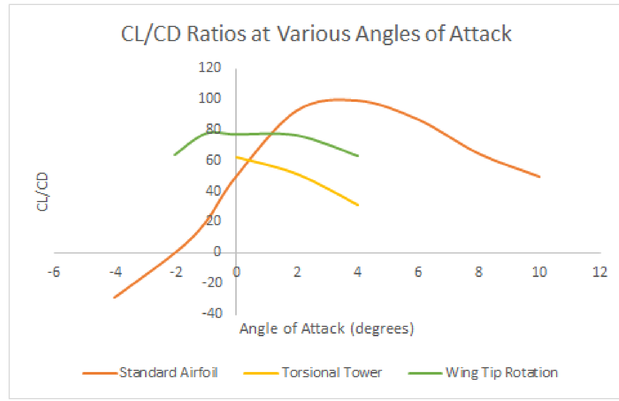
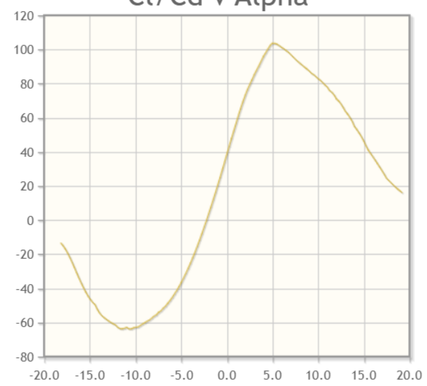
Progress

- Introduced ANSYS simulations to new members
  - Tutorials now available to streamline development
- 3D printer and parts purchased
- Pulley System has been fabricated

ANSYS Results



Composition of 3 Designs



Coefficient of Lift to Drag ratio for various AOA for NACA 2414 airfoil.