



Long Range Drone

Member: Vincenzo Pizano, Kristy Wu, Jenny Wang, Aaron Lim, Darron Tran, Tom Nguyen



Sponsor: Yun Wang

Summary

Our overall objective is to create an electric powered, aircraft-like drone, designed for endurance and range, with a launcher capable of giving the drone an initial boost.

Key Features

Launcher:

- Launch with elastic band system
- Over 1 meter in length
- ~40° launching angle

Drone:

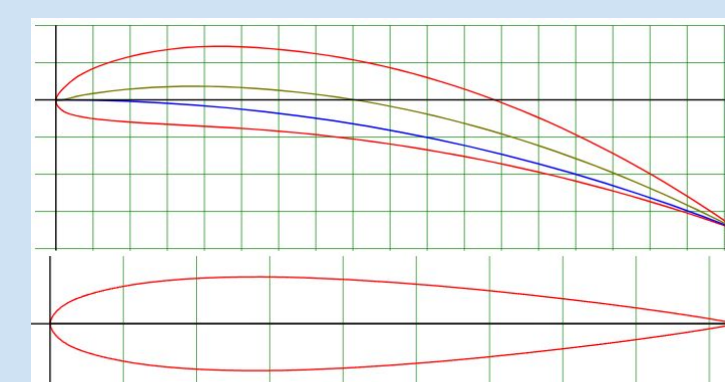
- Electric powered propeller
- Fixed-wing design
- Landing system

Team Contributions

Responsibility	Team Member
Team Lead, Wing Design, Drone Assembly	Vincenzo Pizano
Fuselage Design	Darron Tran
Landing Gear Design	Aaron Lim
Propeller Design, Electronic Component Analysis	Jenny Wang
Design and Assembly of Launcher Chassis	Kristy Wu
Launcher Leg Design	Tom Nguyen

Results and Progress

- Use of Clark Y for main wing
 - 187.5mm base chord, 600mm half span
- Use of NACA 0009 smoothed for horizontal and vertical stabilizers
 - horizontal: 93.75 mm chord, 125% thickness, 225mm half span
 - vertical: 93.75mm chord, 150% thickness, 81.2mm height



- Simulation Data performed on different ½ span types
 - decided upon .85 scale taper, 500 chamber

Airfoil ½ Span	.6 taper, 500 chamber, 30 m/s	Straight, 500 chamber, 30 m/s	.85 taper, 500 chamber, 30 m/s
Lift (N)	24.48141322	37.52586897	35.99280793
Drag (N)	0.440295684	0.557551415	0.11307487
Shear stress X (Pa)	0.55989367	1.40660712	0.405062423
Shear stress Z (Pa)	0.00158955	0.016055799	-0.00152989

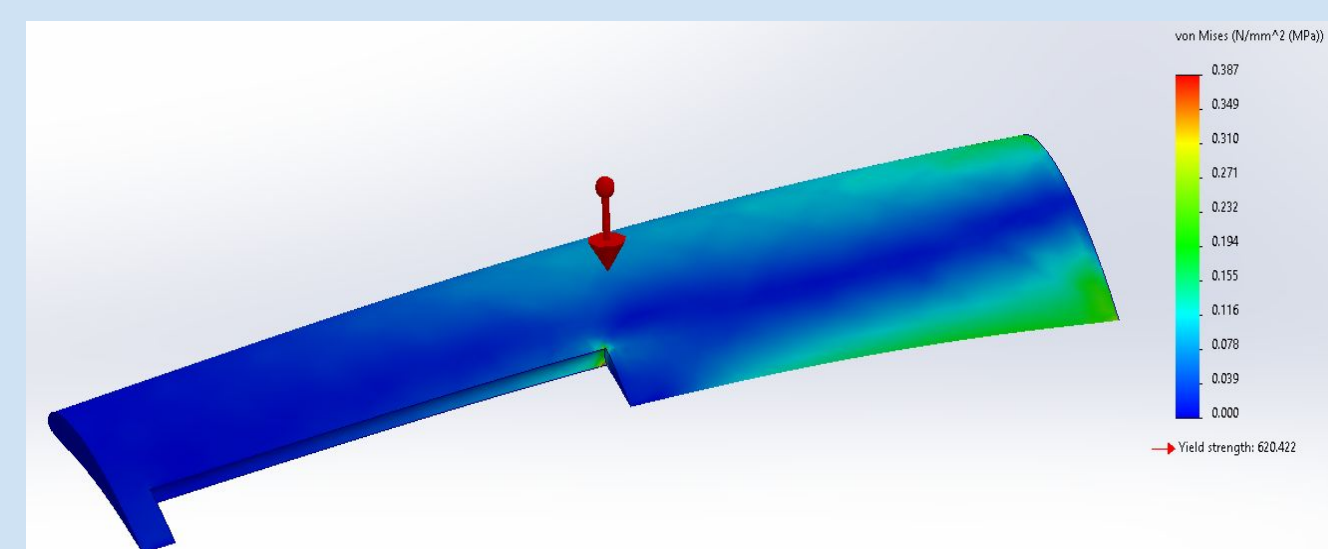


Fig 1. Analysis of Wing

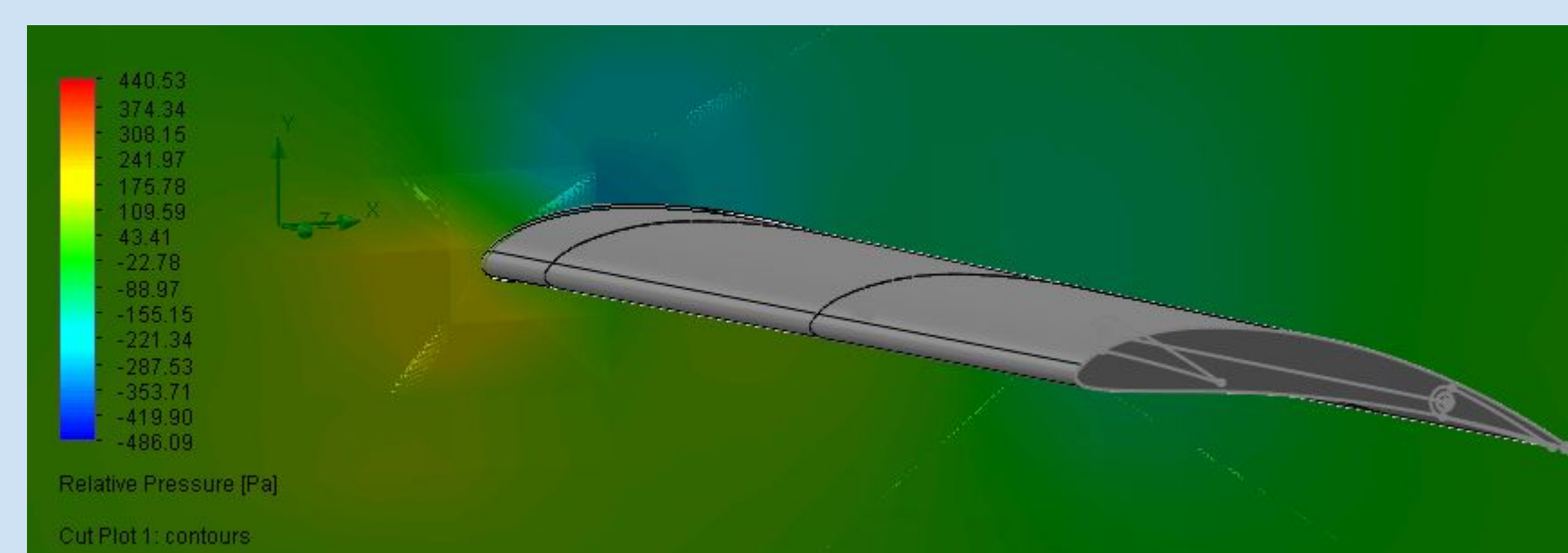


Fig 2. Analysis of Wing

Electronic Component

Battery: 11.1V, 5200mAh; Lithium Polymer

ESC: 11.1V, 80A

Motor: 45.1A 1300KV lower KV reduce power usage

FC: 6-30V, 132A

Servomotor: 5V, 2.4A; total of four are used

Sensor:

- Accelerometer: used to measure forces cause by acceleration and gravity to adjust drone's speed and direction, maintaining level flight.
- Gyroscope: used to measure angular velocity and rotational direction of the drone, maintaining stable orientation of the drone

Design

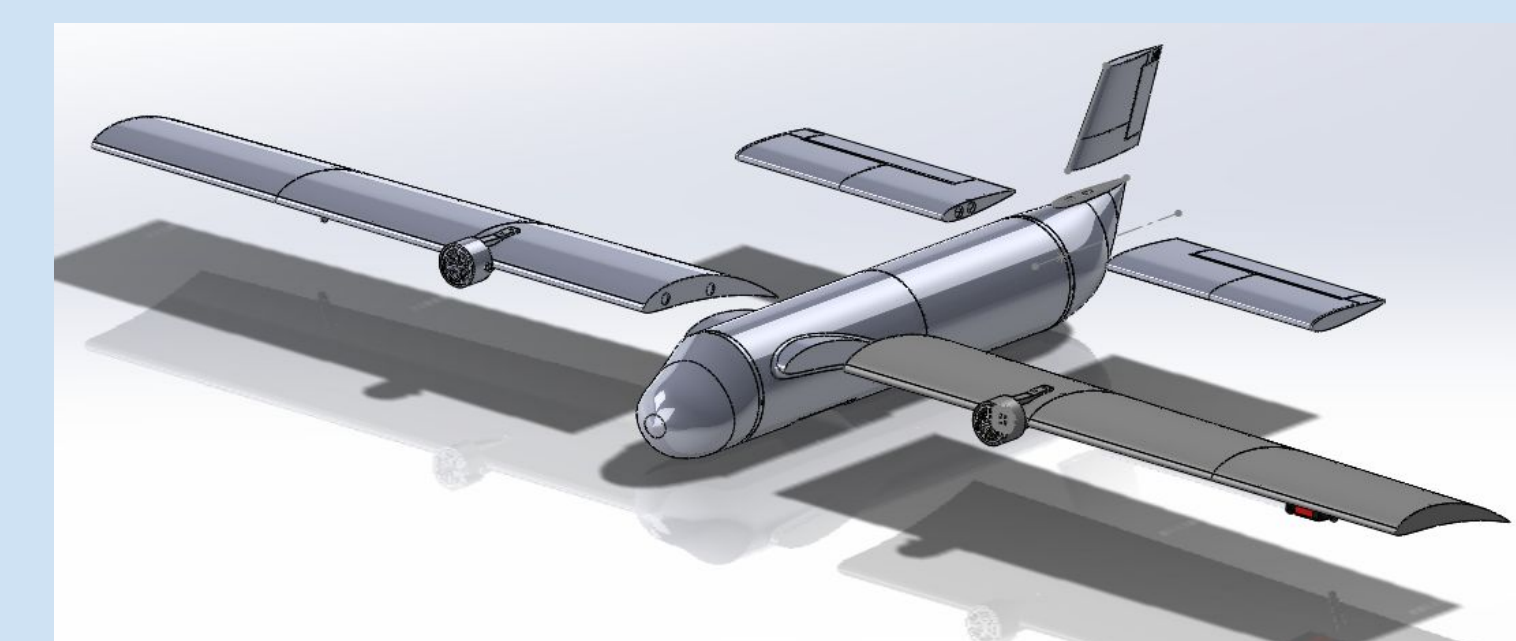


Fig 3. CAD Model of Drone

Future Improvements

- Longer flight duration and travel distance with same battery capacity
- Reduce mass of both launcher and drone

Acknowledgements

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