



# Virtual Design Review 1

Team 507 - SAE Aero Design – Aero and Propulsion Team

# Team Introductions

**Sasindu Pinto – Project Engineer & Aeronautics/Propulsion Engineer**



**Noah Wright-Aerodynamics Engineer**



**Michenell Louis-Charles-Thermal Fluids Engineer/Financial Chair**



**Cameron Riley – Materials/Hardware Engineer**



**Adrian Moya – Systems/Hardware Engineer**



# Sponsor and Advisors



Florida Space Grant Consortium  
Funding Sponsor



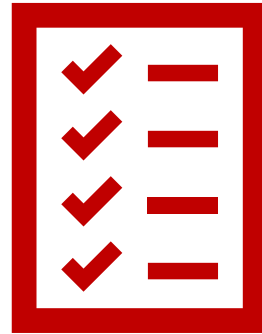
Seminole RC Club  
Equipment/Personnel Sponsor



Dr. Chiang Shih  
Professor & AME Center Director  
Advisor

Presenter: MLC

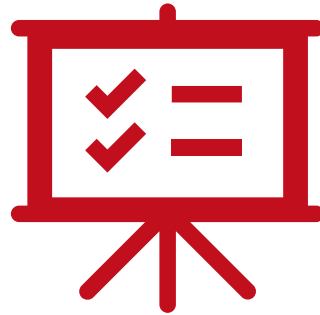
# Project Objective



The objective of this project is to design and manufacture a remote-controlled plane within the rules and regulations of the SAE Aero Design East Competition 2021. The plane will primarily be 3D printed. It will be able to take-off and land carrying the required cargo and complete the necessary flight path.

Presenter: MLC

# Team Objective

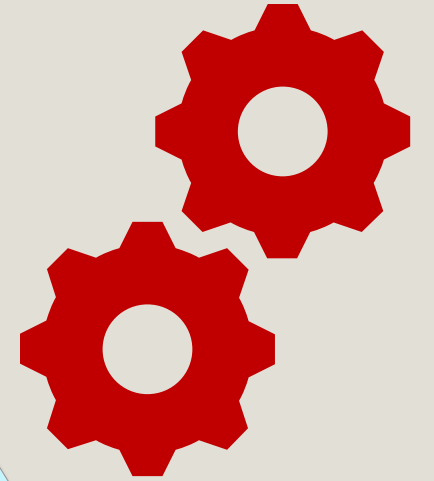


The objective of the aero-propulsion team is to ensure that the plane takes off and lands while carrying a payload while completing the flight path.

Presenter: MLC

# Project Background

Presenter – Michenell Louis-Charles



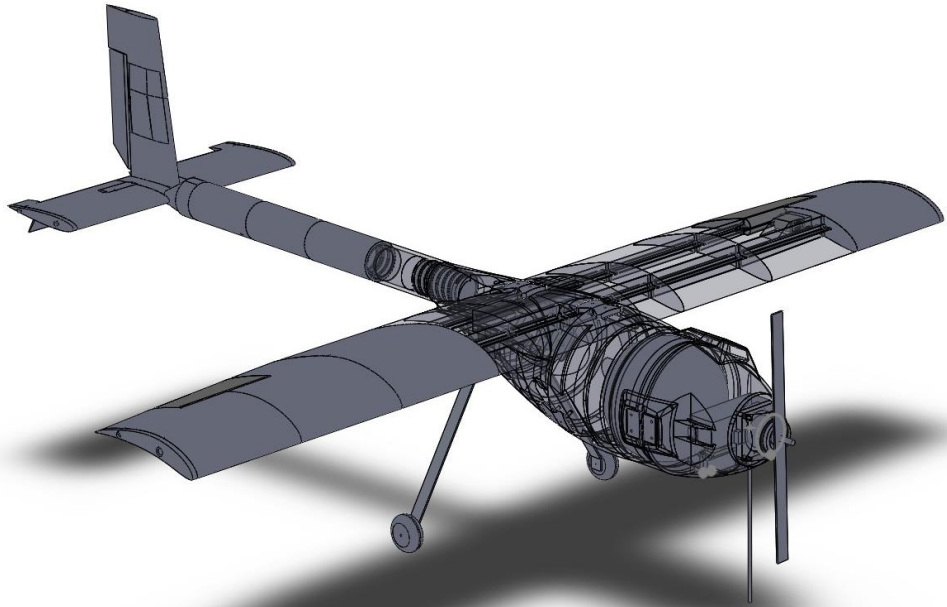
# SAE Aero Design East Competition



- 🏆 Yearly competition where students from schools across the world compete with built RC airplanes
- 🏆 Competition involves a technical presentation, airplane inspection, and flight testing

Presenter: MLC

# Last Year's Design



- ✈️ The plane did not take off but had good elements to it
- ✈️ New design will be based on but not limited to last year's aircraft

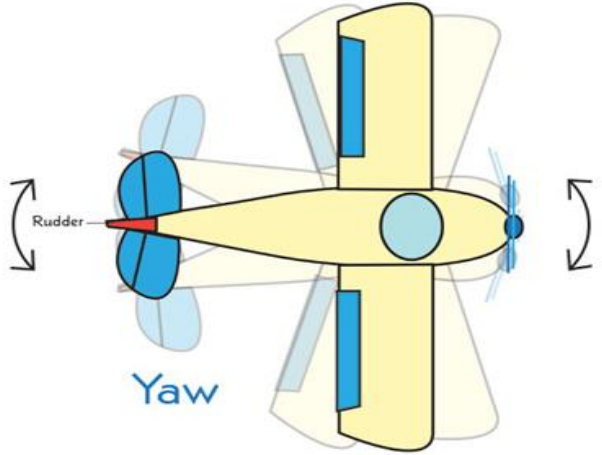
Presenter: MLC



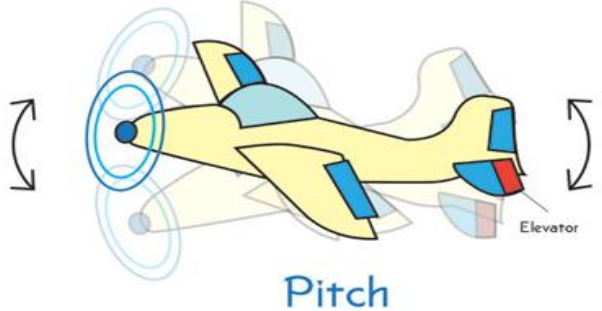
# Key Definitions



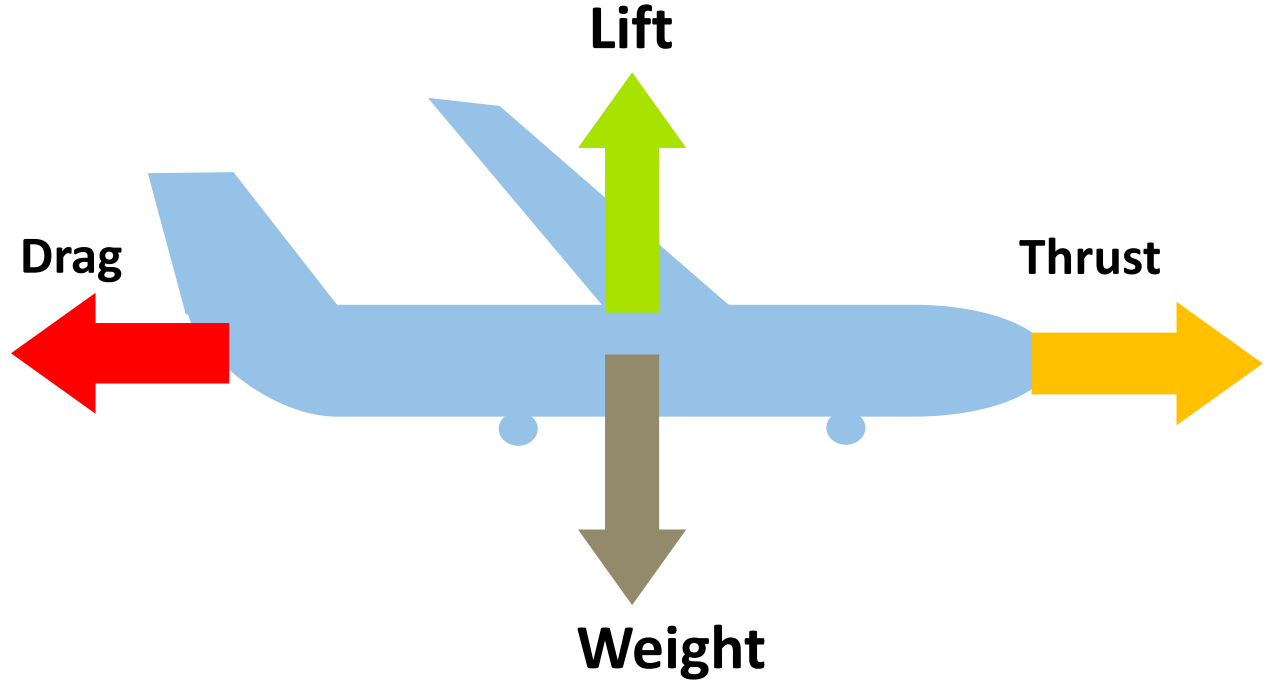
Use the ailerons to control  
**Roll**



Use the rudder to control  
**Yaw**



Use the elevators to control  
**Pitch**



Presenter: MLC

# Project Scope

Presenter – Michenell Louis-Charles



# Key Goals



- ⦿ The plane is primarily 3D printed, with the help of the geometric team
- ⦿ The plane takeoff, cruise, and land while carrying a cargo load
- ⦿ The plane carries a minimum of one soccer ball as the cargo load

Presenter: MLC

# Key Goals

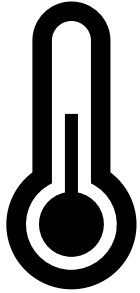
🎯 The cargo bay can be accessible with minimum effort



🎯 The plane can withstand environmental conditions at the time of flying

Presenter: MLC

- Flown in atmospheric conditions at sea level



- Will be used for competition purposes

**SAE AERO DESIGN<sup>®</sup>**



- Will be controlled by one pilot

Presenter: MLC



Society of  
Automotive  
Engineers

Primary



Advisors



Sponsors

M  
A  
R  
K  
E  
T  
S

Professionals in the  
Aviation field



Aviation  
Companies



Secondary

RC  
Hobbyists



Scholars that  
Reference This Project



Presenter: MLC





# Stakeholders

- ✿ Dr. McConomy and Dr. Shih
- ✿ FAMU-FSU College of Engineering
- ✿ SAE Design Competition
- ✿ Seminole RC Club
- ✿ Senior Design Teams 507 & 508

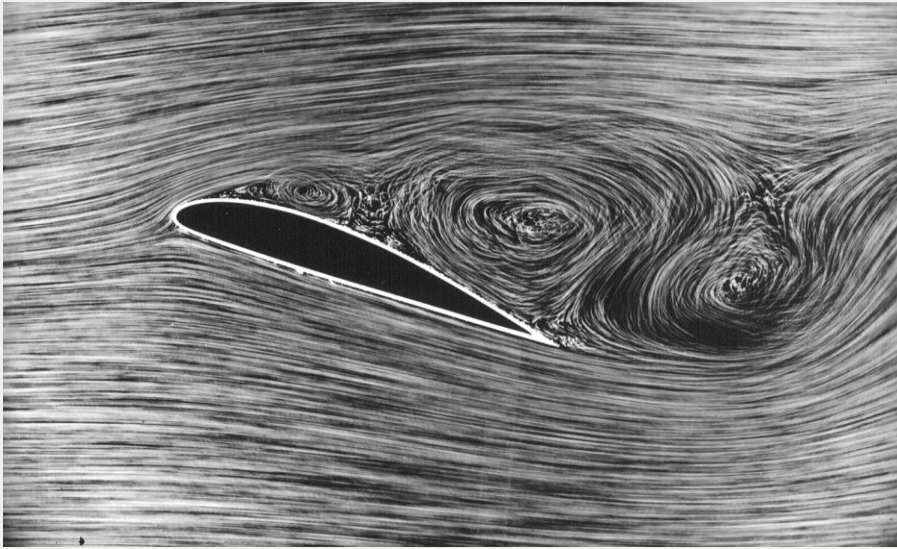


Presenter: MLC

# Differentiation From Team 508

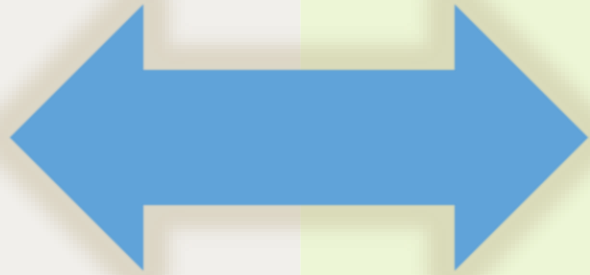
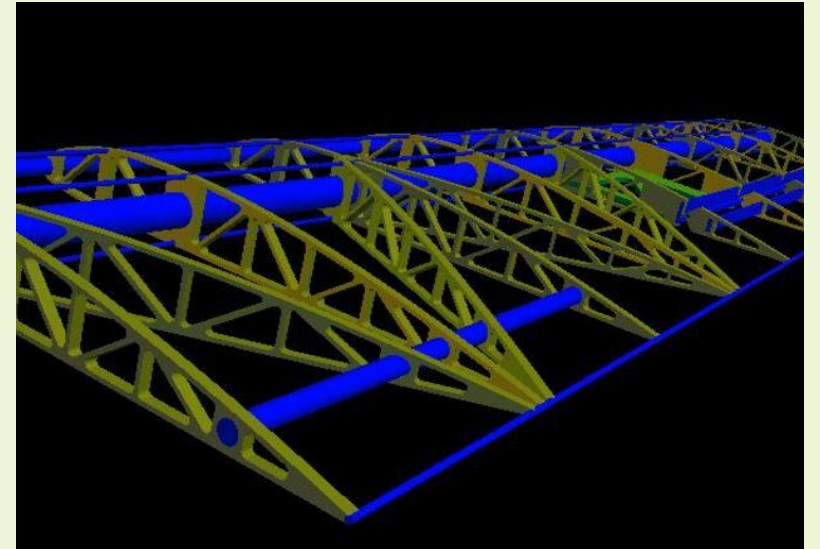
## ✦ Team 507

- ✦ Focused on fluid design and propulsion calculations
- ✦ Create initial design of plane components



## ✦ Team 508

- ✦ Focused on geometric integration
- ✦ Makes sure every design fits together when 3D printing



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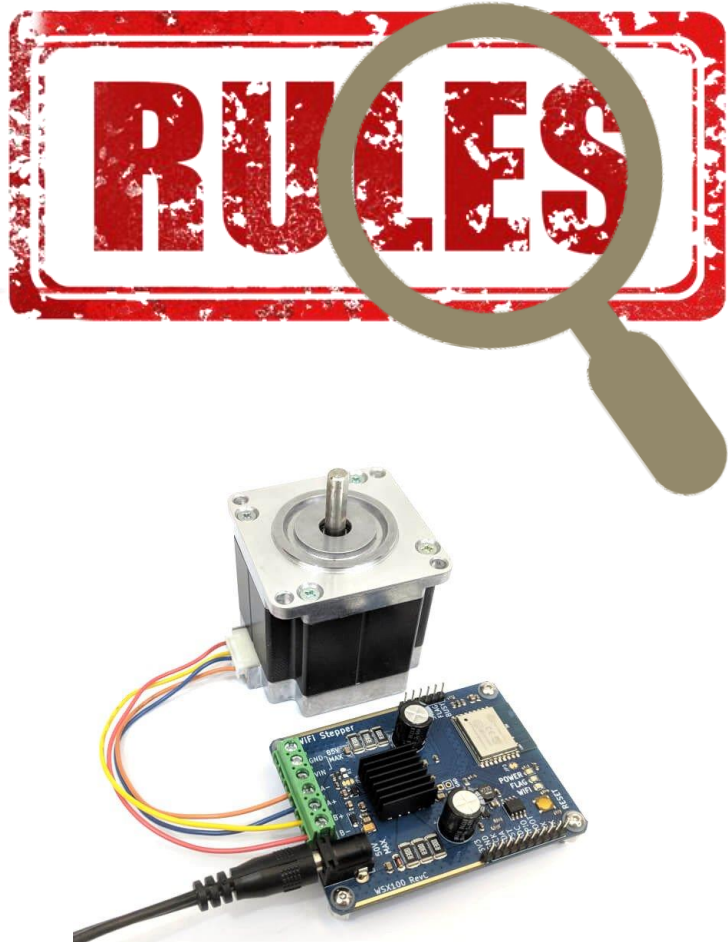


# Customer Needs

Presenter - Noah Wright



# Customer Needs

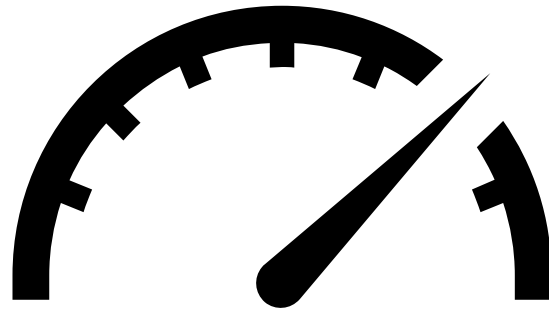
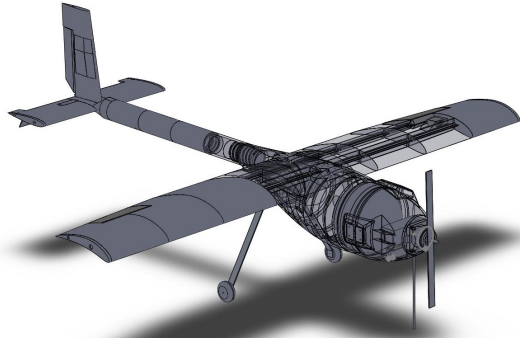


## Competition Rules

- ✓ Physical Aircraft Requirements
- ✓ Control Requirements
- ✓ Material Requirements
- ✓ Electronic Requirements
- ✓ Payload Requirements
- ✓ Mission Requirements

Presenter: NW

# Customer Needs

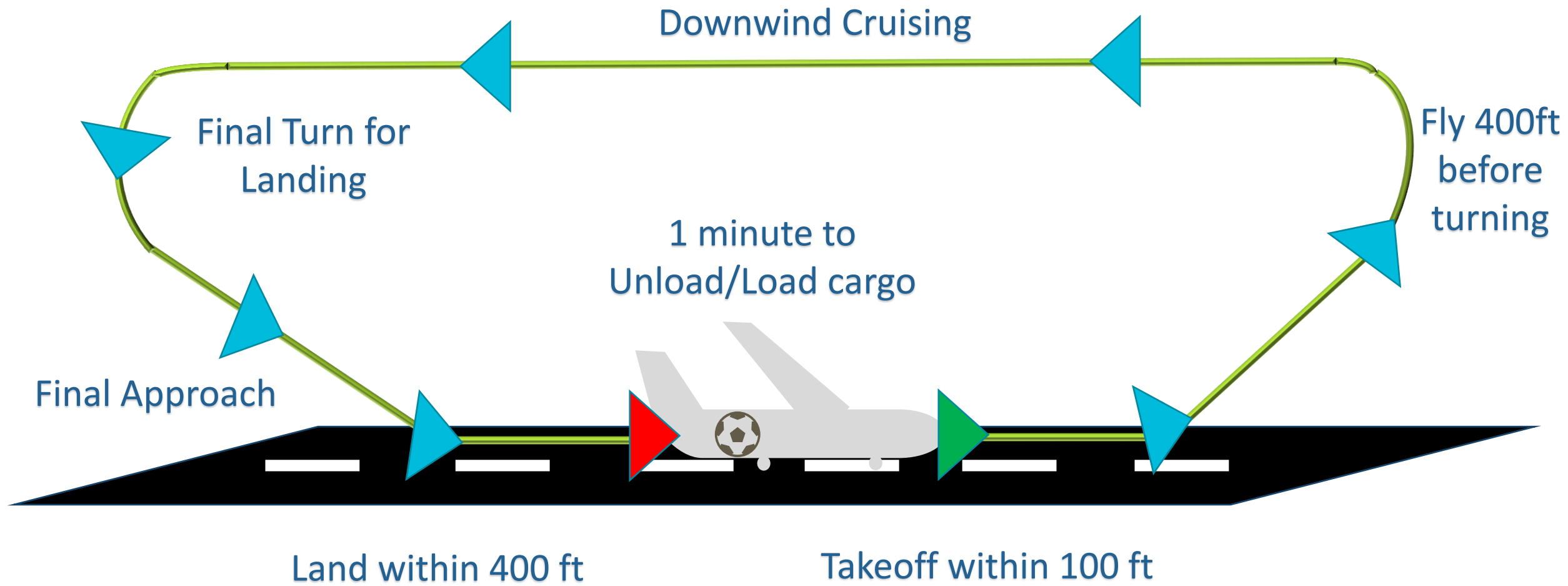


## Dr. McConomy

- ✓ 3D Printed
- ✓ Improve Upon Prior Work
- ✓ A Signature Innovation
- ✓ Performance Goals

Presenter: NW

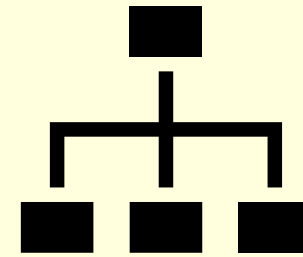
# Flight Path



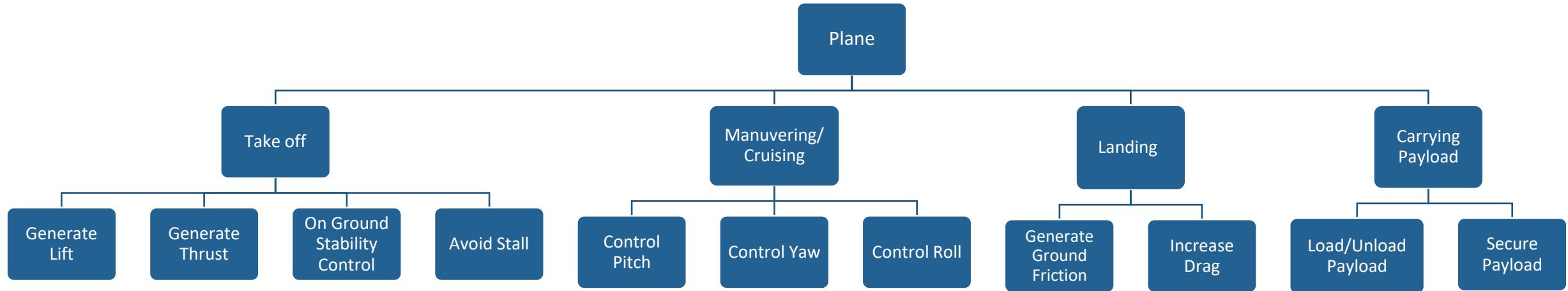
Presenter: NW

# Functional Decomposition

Presenter – Noah Wright

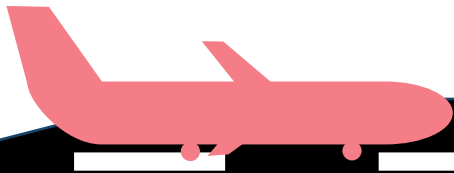
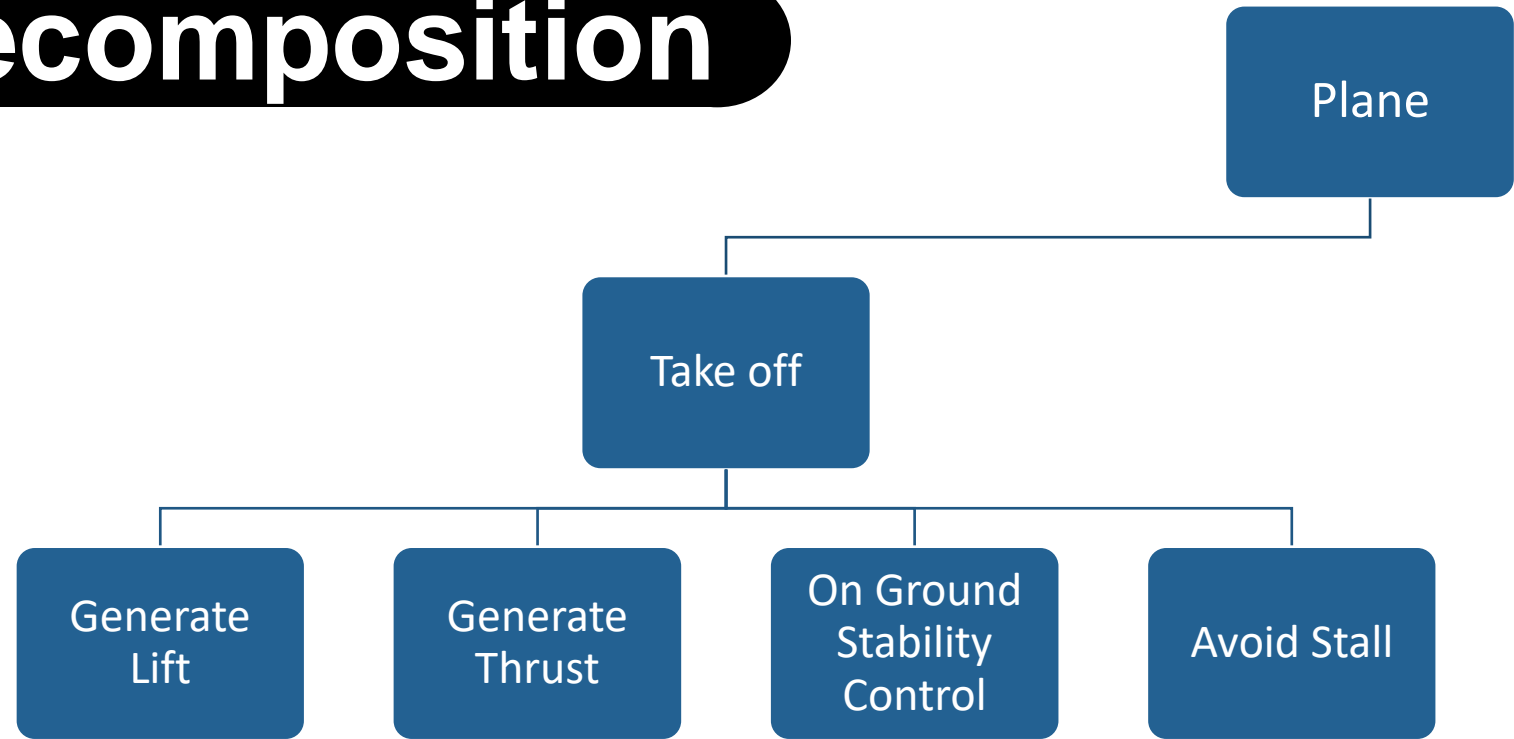


# Functional Decomposition



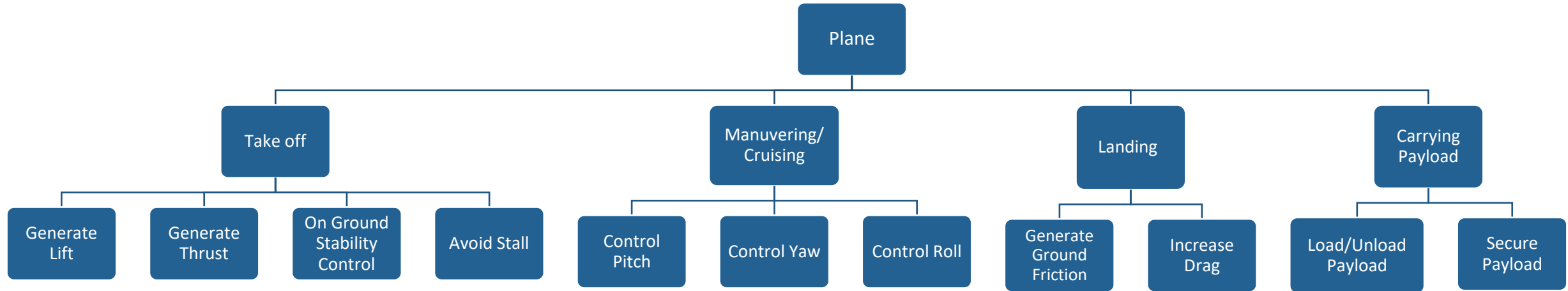
Presenter: NW

# Functional Decomposition



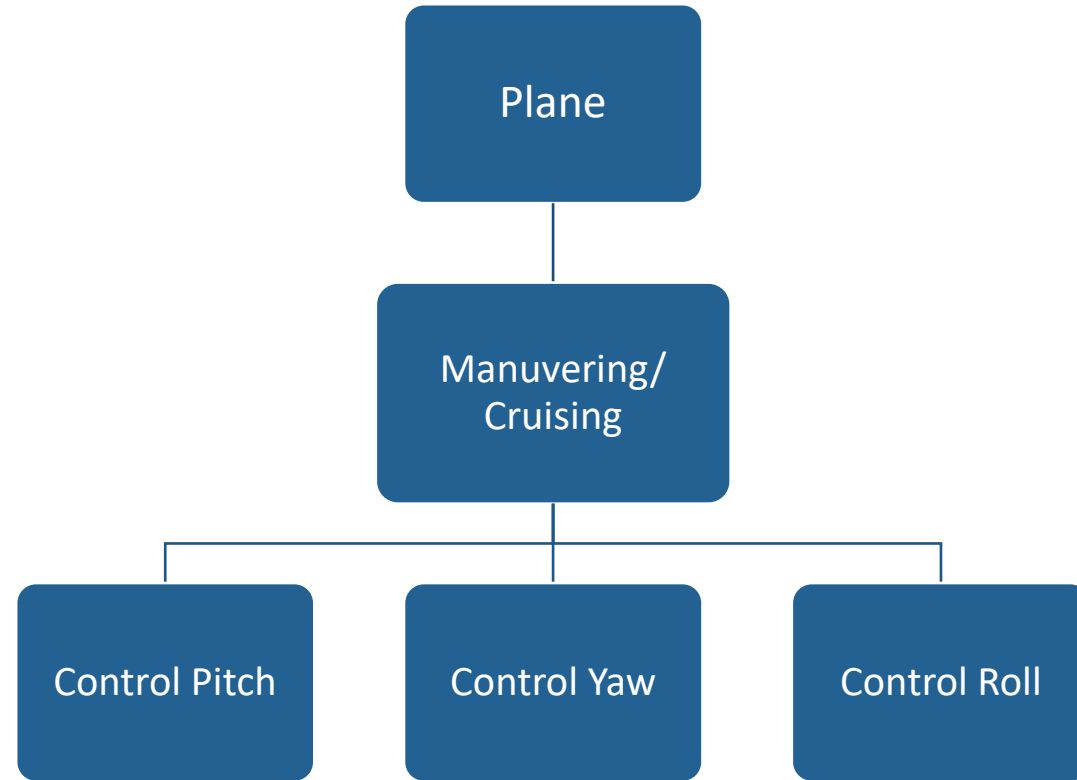
Presenter: NW

# Functional Decomposition

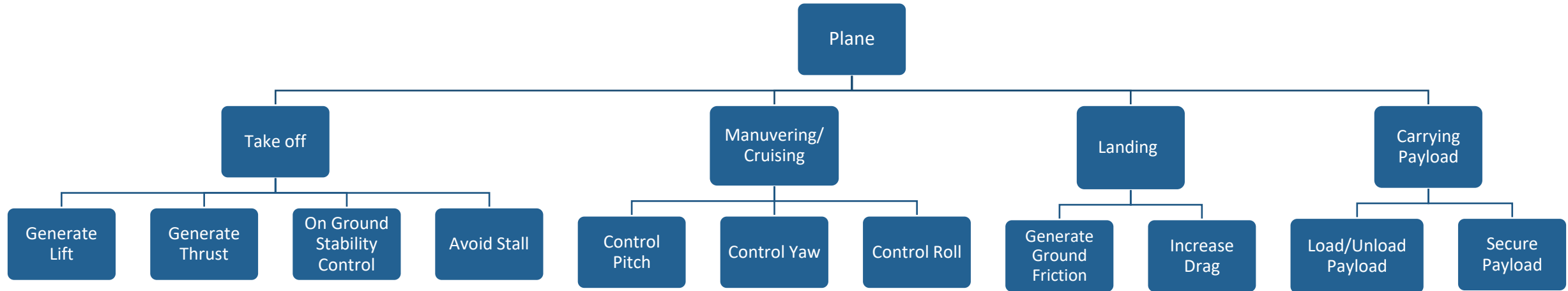




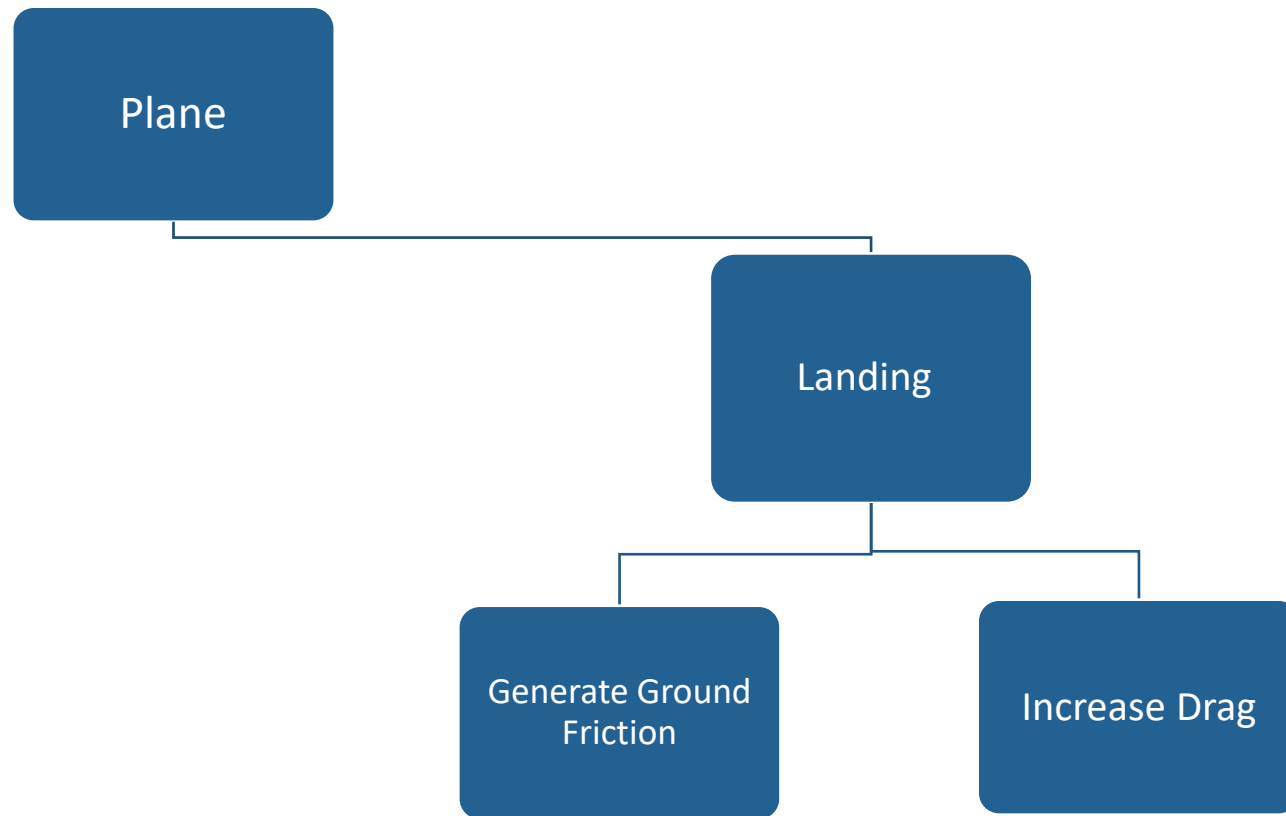
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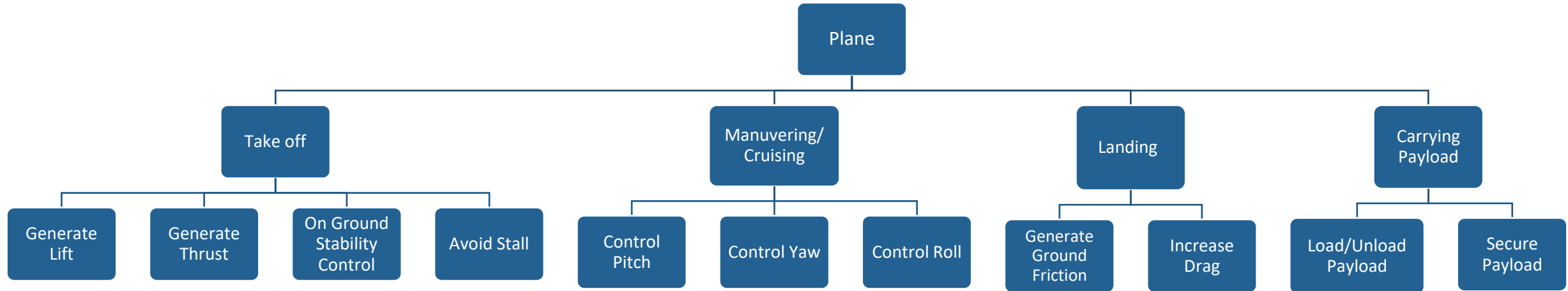
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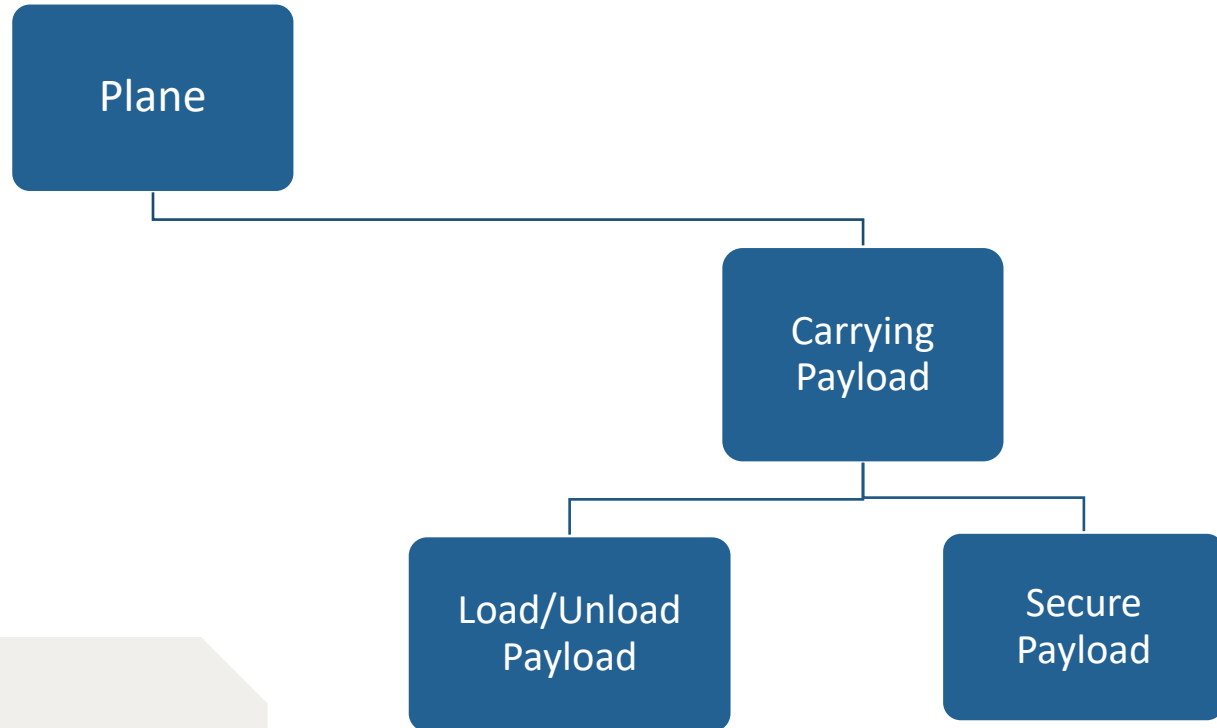
# Functional Decomposition



# Functional Decomposition



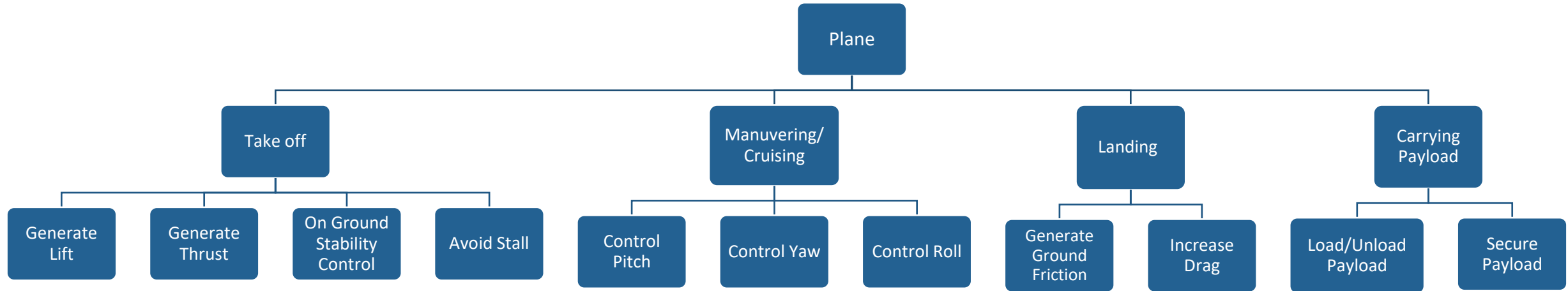
# Functional Decomposition



Circumference – 70 cm (28 in)  
Weigh – 450g (16 oz)  
Pressure – 0.1 MPa (16 psi)

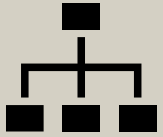
Presenter: NW

# Functional Decomposition



# Project Timeline – FALL

Function  
Decomposition



SEP

Concept  
Generation

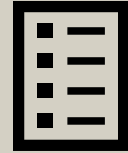


OCT

Concept  
Selection



Calculate Thrust and  
Power Usage



NOV

Evaluate  
Calculations from  
2020 Design



Simulation Data  
for 2020 Design

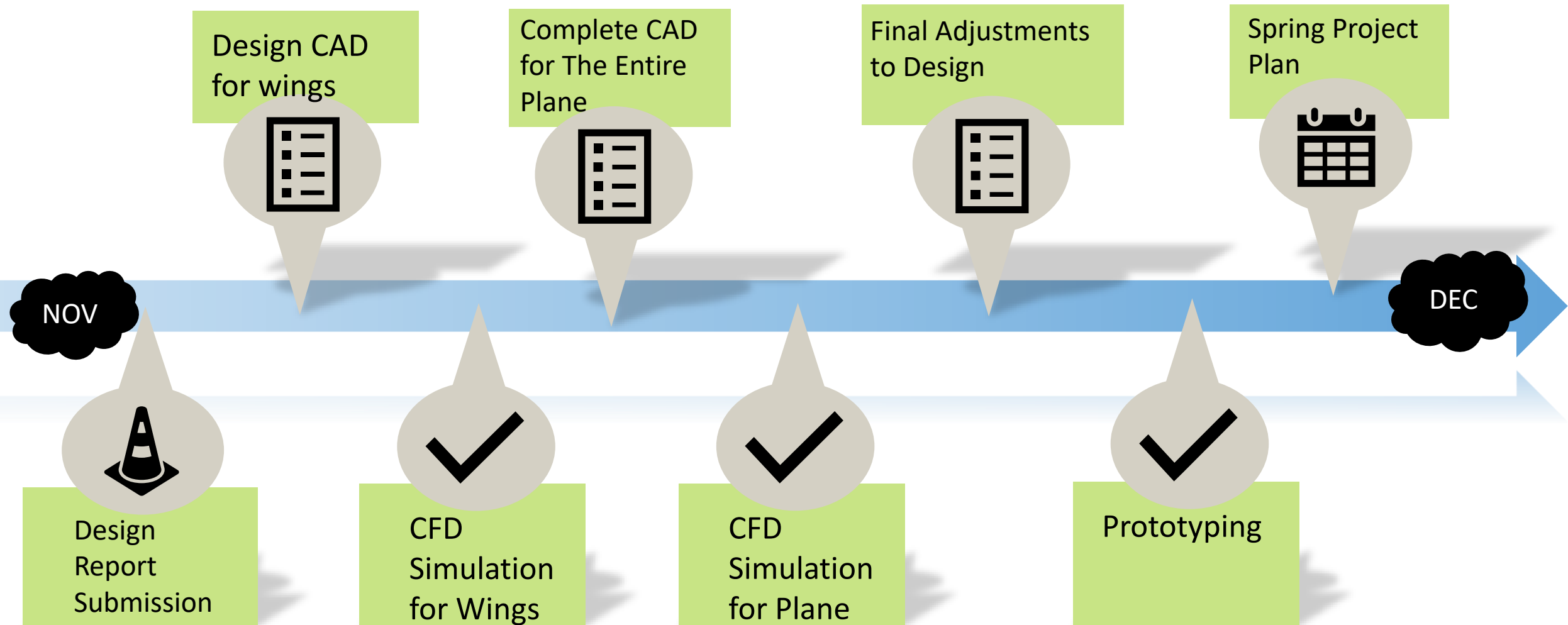


Calculate  
Lift/Drag



Presenter: NW

# Project Timeline – FALL



Presenter: NW



# Summary



1. Objective - Ensure that the plane takes off and lands while carrying a payload while completing the flight path.



2. The plane carries a minimum of one soccer ball as the cargo load



3. Customer needs gathered using competition rule book and sponsor requirements



4. Major Systems – Takeoff, Cruising, Land, Carrying Payload



5. Key Minor Systems – Generate Lift, Generate Thrust, Avoid Stall, Generate Ground Friction, Increase Drag

Presenter: NW

# References

SAE Aero Design Competition 2021 Rule Book. Available on:  
<https://public.3.basecamp.com/p/38Lpy4uyTLpNkwTZbtwigtBZ>

Fundamentals of Aerodynamics. John D. Anderson Jr. 2011. 5<sup>th</sup> Edition. McGraw Hill Publications.



**Questions?**

# Future Work

- Design specific components

# Assumptions

- Will be flown in atmospheric conditions at sea level including gravity, pressure, and temperature
- Majority of Plane will be 3D printed
- Will be used for competition purposes
- Motors and electronics used to control and propel the airplane will be store bought and not custom-made
- Will be controlled by one pilot



# Timeline – FALL

