# FanFlyer: Concept Generation & Evaluation

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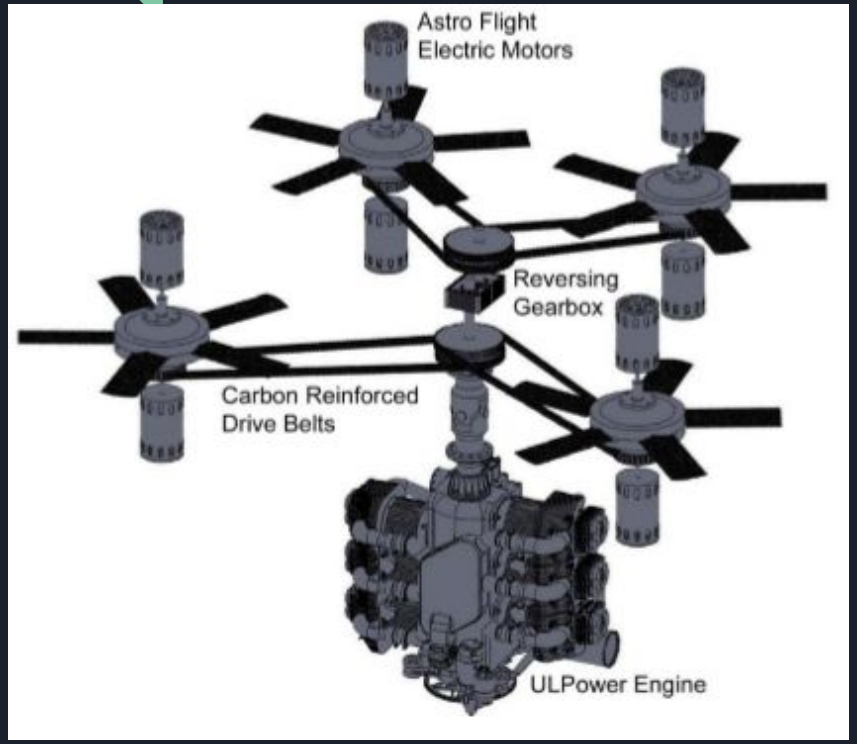
# FanFlyer description & recapitulation

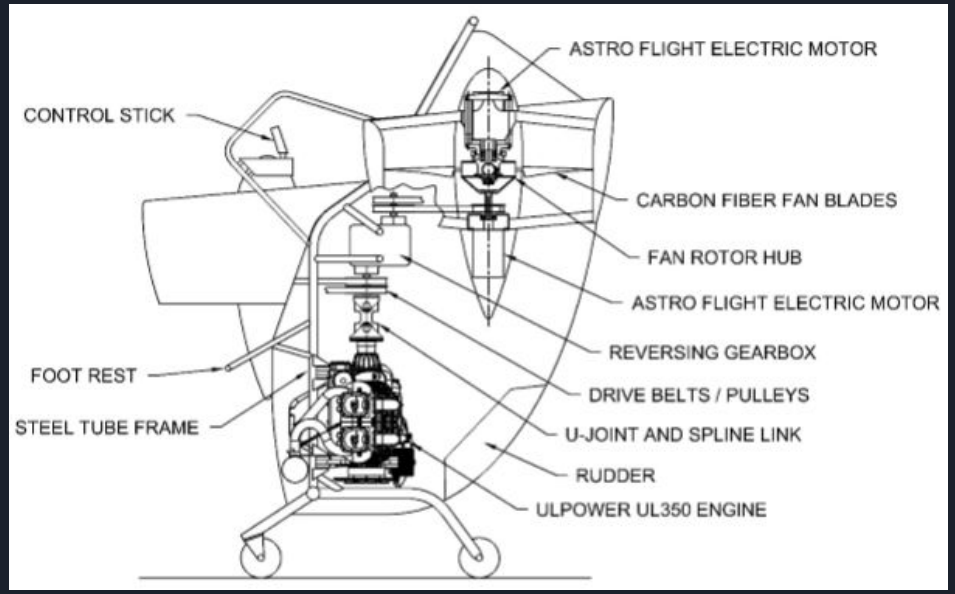
Jim Corning of Novakinetics Aerosystems has requested the aid of NAU engineering to assist in their participation in the GoFly competition.

Team FanFlyer's role, is providing a design for the internal aircraft frame. The chosen design will be based on Finite Element Analysis modeling & simulation, formed from forces the frame is expected to endure.

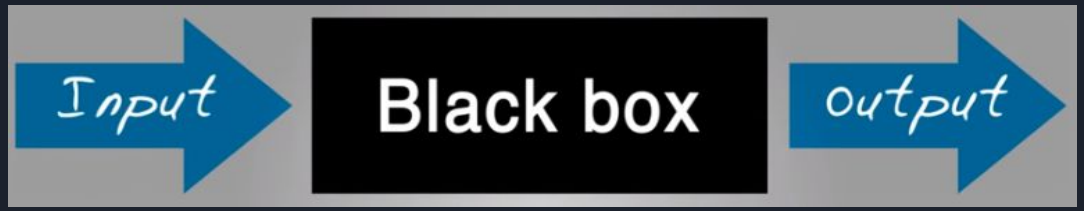
NOVAKINETICS AEROSYSTEMS

# Dependant Variables



# Functional Decomposition




**Construction Input (matter)**

- 4130 Steel
- Welding materials
- Fasteners (Nuts, Bolts, Rivets )
- Finite Element Analysis simulation

**Functional Input (Energy)**

- **Forces (Stress, Strain, Gravity)**
- **Heat**
- **Vibrations**

**Support Frame**

**Support Frame**

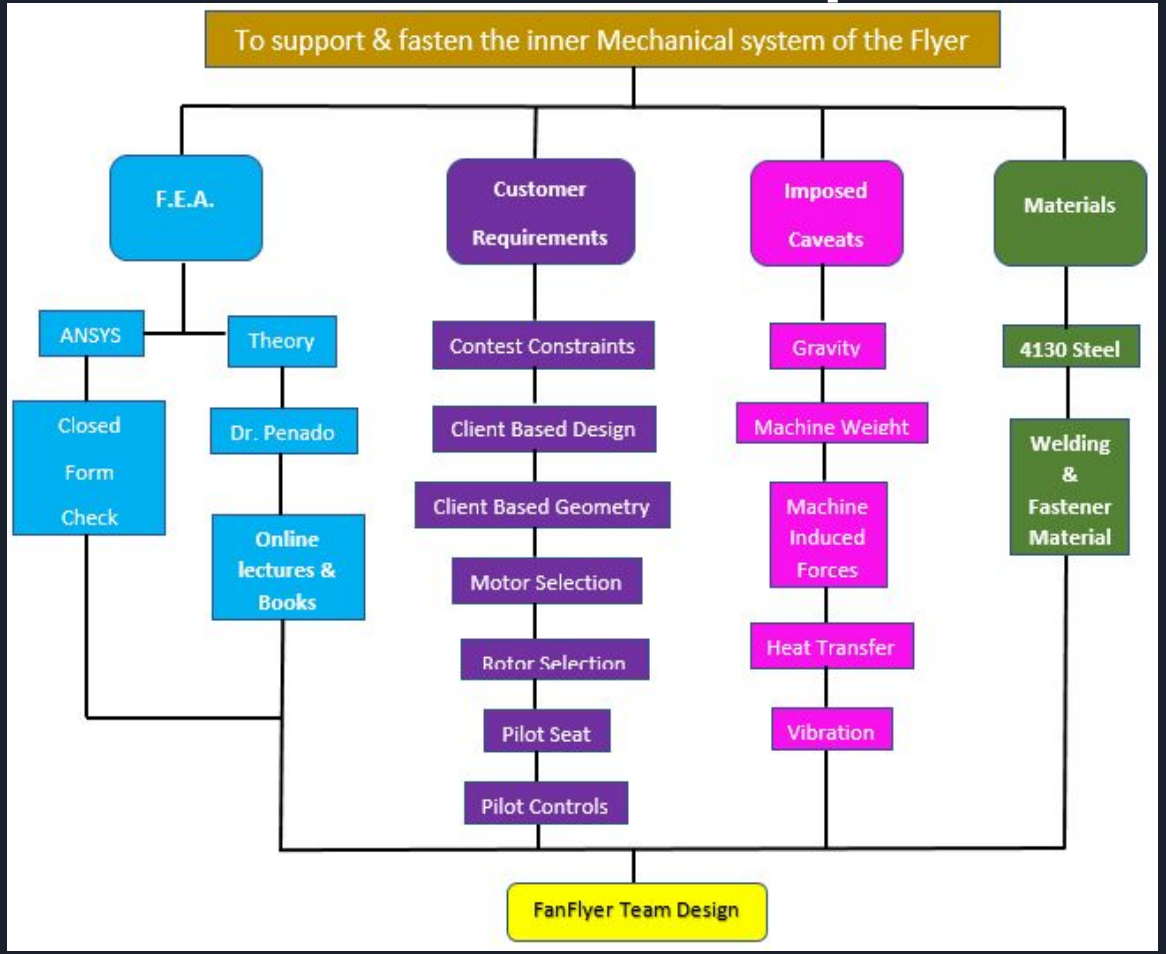
**Construction Output**

- Metal Support Frame

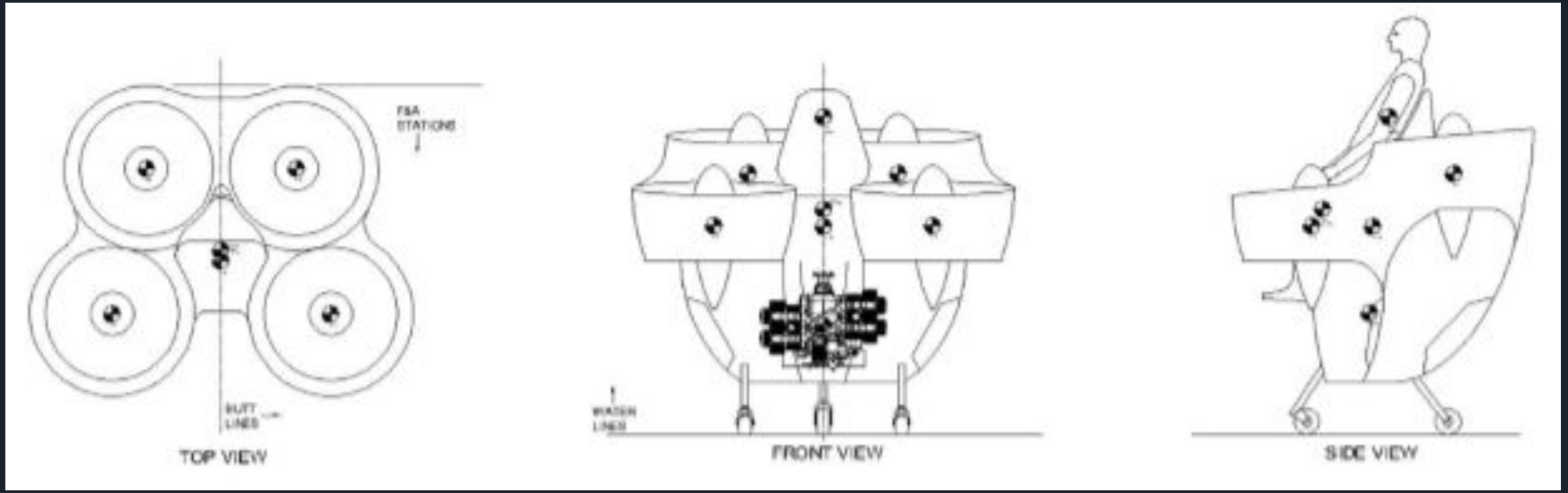
**Functional Output**

- Counter balanced forces
- Heat dissipation & resistance
- Dampening & redirection

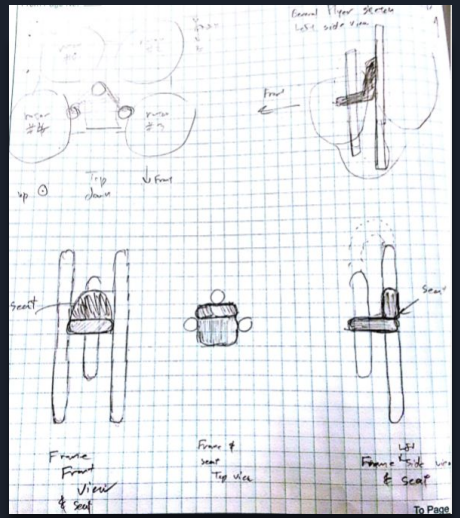
# Functional Decomposition



# Base design from Novakinetics



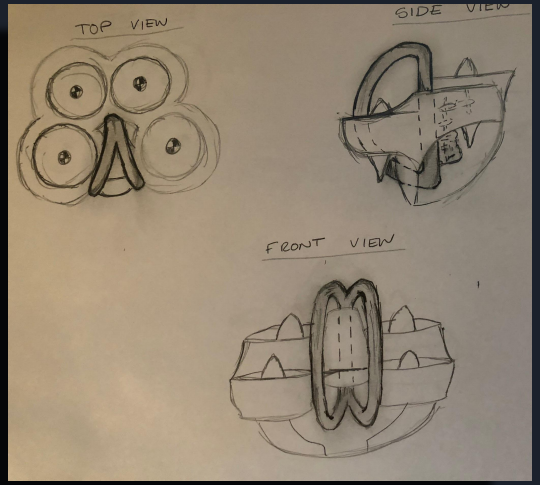
# Design Consideration




Concept #2

Advantages: Lightweight , Ease of analysis and manufacturing

Disadvantages: Joint Failures, Stability, Structural Rigidity, Aesthetics

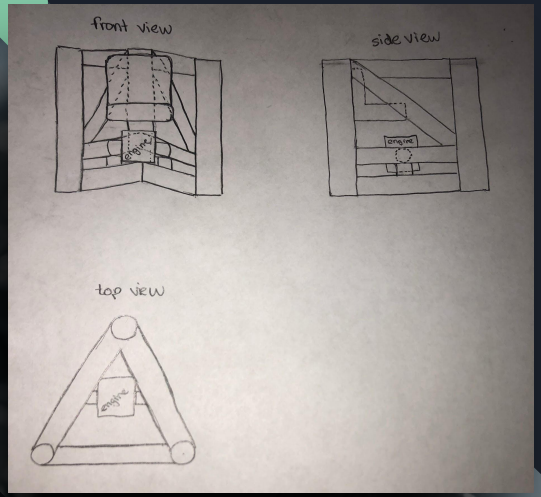



Concept #1

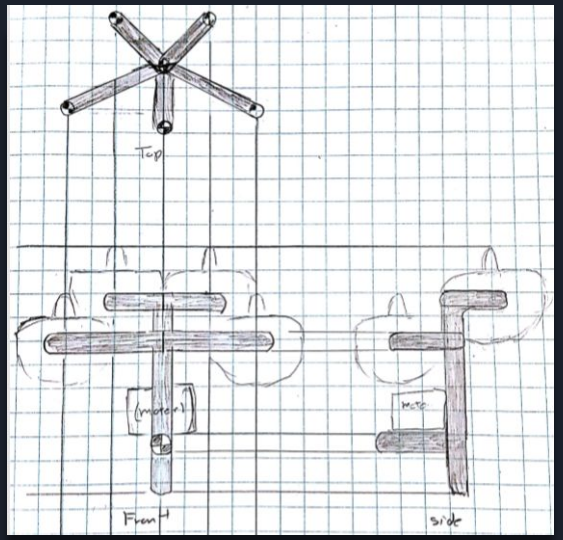
Advantages: Lightweight, Secure Joints, Simple Geometry

Disadvantages: Stability/Balance, Pilot Safety

# Design Consideration Cont..




Concept #4




Concept #6

Advantages: Structurally Stable, Strong Joints

Disadvantages: Heavy, Safety, Analysis

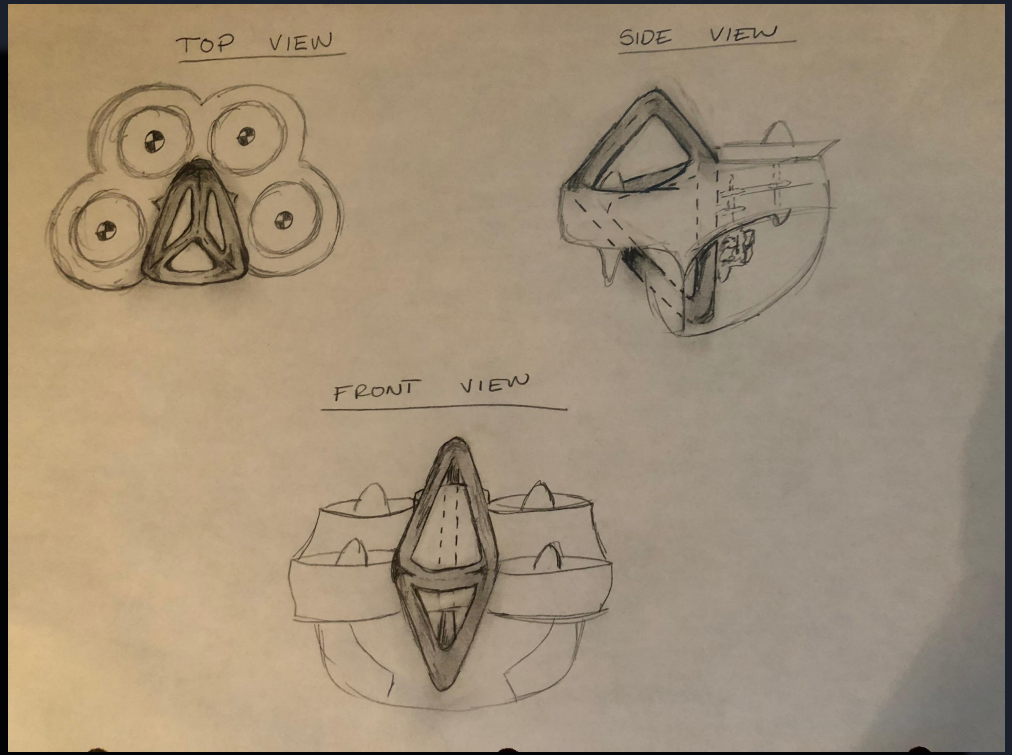
Advantages: Aesthetics, Lightweight, Ease of Analysis

Disadvantages: Stability, Balance, Joint Failures

# Decision Matrix

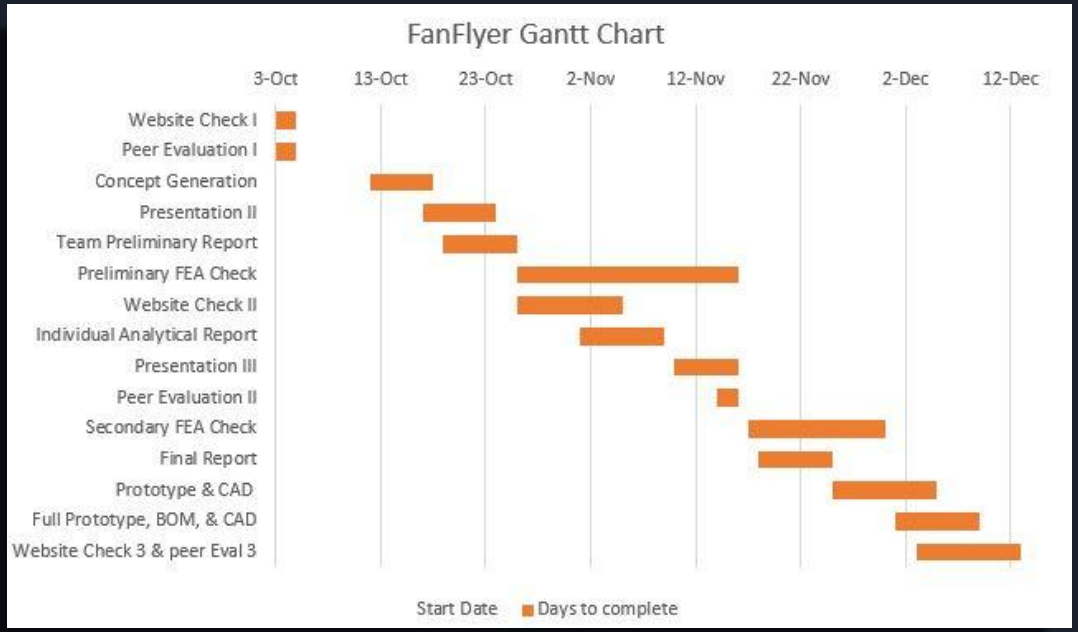
| | | Design #1 | | Design #2 | | Design #3 | | Design #4 | | Design #5 | | Design #6 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Weighting | Score | Total | Score | Total | Score | Total | Score | Total | Score | Total | Score | Total |
| LightWeight | 5 | 4 | 20 | 3 | 15 | 4 | 20 | 4 | 20 | 2 | 10 | 4 | 20 |
| Stability/Balance | 5 | 2 | 10 | 4 | 20 | 3 | 15 | 3 | 15 | 2 | 10 | 2 | 10 |
| Ease of Manufacturing/Assembly | 4 | 4 | 16 | 4 | 16 | 4 | 16 | 4 | 16 | 2 | 8 | 3 | 12 |
| Possibility of Joint Failure | 4 | 5 | 20 | 2 | 8 | 4 | 16 | 3 | 12 | 1 | 4 | 3 | 12 |
| Ease of Analysis/ load testing | 3 | 4 | 12 | 3 | 9 | 3 | 9 | 3 | 9 | 3 | 9 | 4 | 12 |
| Aesthetically Pleasing | 2 | 3 | 6 | 3 | 6 | 5 | 10 | 4 | 8 | 4 | 8 | 5 | 10 |
| Safety/ Operator Protection | 5 | 2 | 10 | 4 | 20 | 4 | 20 | 4 | 20 | 3 | 15 | 4 | 20 |
| | Total | | 94 | | 94 | | 106 | | 100 | | 64 | | 96 |

# Design Selected




Concept #3

# Gantt Chart/ Scheduling



# Budget

**Total Budget**

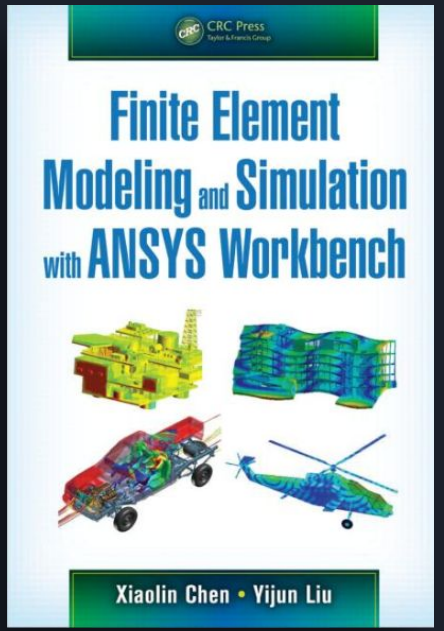
- No monetary budget
- FEA designing
- Out of pocket

**Expenses**

- Team meetings: $14

**Anticipated Expenses**

- Purchase FEA textbook: $90-$111



Thank you!