
THE WEAKEST LINK

ROLES

- Nick – Team Manager
- Josh – Design
- Lauren – Structures
- Ryan – Aerodynamics
- Cade – Propulsion
- Andrew - Manufacturing
- Cayden - Controls/Test Pilot

STRATEGY

Boeing V-22 Osprey

Project Strategy

- Design and construct a cost-efficient aircraft that is light-weight and maneuverable
- Complete all requirements of the LTA assignment
- Further our knowledge of flight and design processes

Flight Strategy

- Two propellers connected to the body of the craft using two servos
- Similar to the Boeing V-22 Osprey

TIMELINE

Week	Lab	Team Objective
9	LTA Introduction	Preliminary Design Review Presentation Completed
10	Preliminary Design Review	Practice Presentation
11	Preliminary Design Review	Present Power Point
12	Project Build	Build Frame and General Design
13	Project Build	Finalize Frame Details and Attach Electronics
14	*Holiday*	*No Work*
15	Project Build	Small Modifications/String Test and Paint
16	Designs Completed and Displayed	Minor Artistic Touch Ups

ANTICIPATED PROBLEMS AND SOLUTIONS

Problems

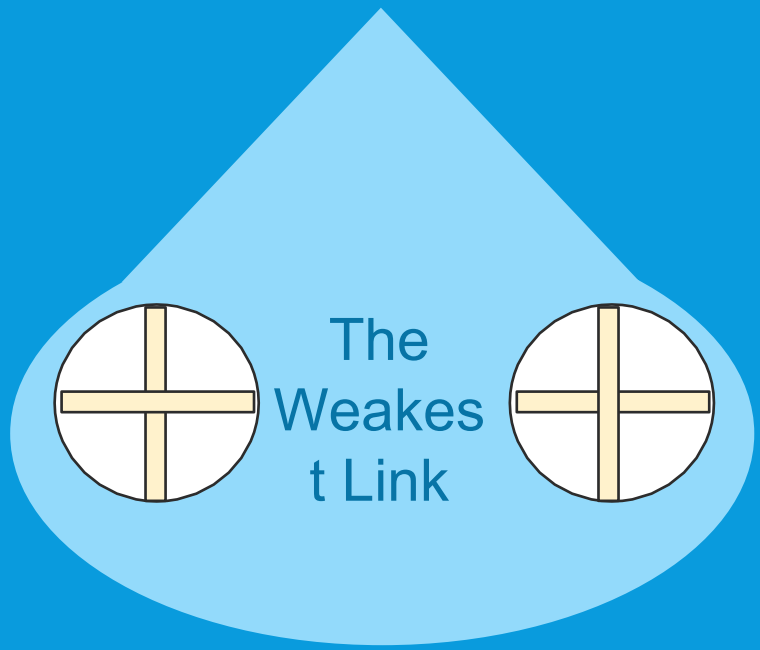
- Balancing the weight distribution of the craft
- Maintaining structural integrity throughout flight
- Attachment of the propellers to the body of the craft

Solutions

- Placing electronics toward the front of the structure to balance the weight in the back
- Utilizing vertical supports inside the craft for added structural integrity
- Connecting servos from the inside of the craft to the outside propellers

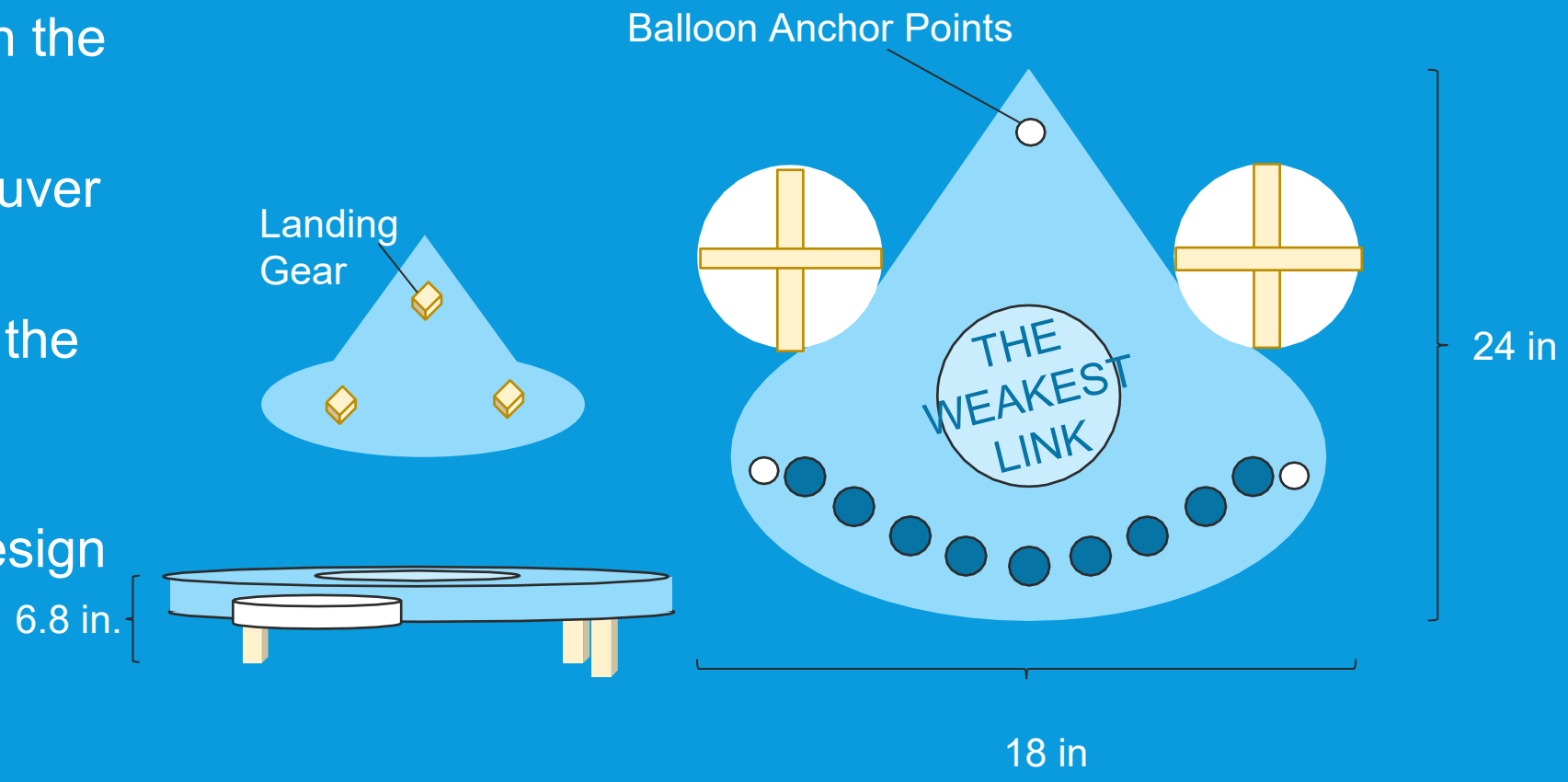
REJECTED DESIGNS

- The embedded propellers limit mobility
- Too large for the weight constraints
- Materials required would exceed budget
- Flight would be unstable



FINAL DESIGN

- Integrates aesthetic elements correlating with the TV show
- Allows the craft to maneuver on all axis
- Stable anchor points for the balloon
- Smaller and more cost-efficient than rejected design



WEIGHT AND COST ESTIMATE

Item	Cost (G)	Weight (g)
Motor & ESC (2)	300	122
Standard Servo (2)	150	86
Propeller (2)	50	14
Wiring	0	50
Receiver	0	14
Power Distribution Board	0	60
Battery	0	1000

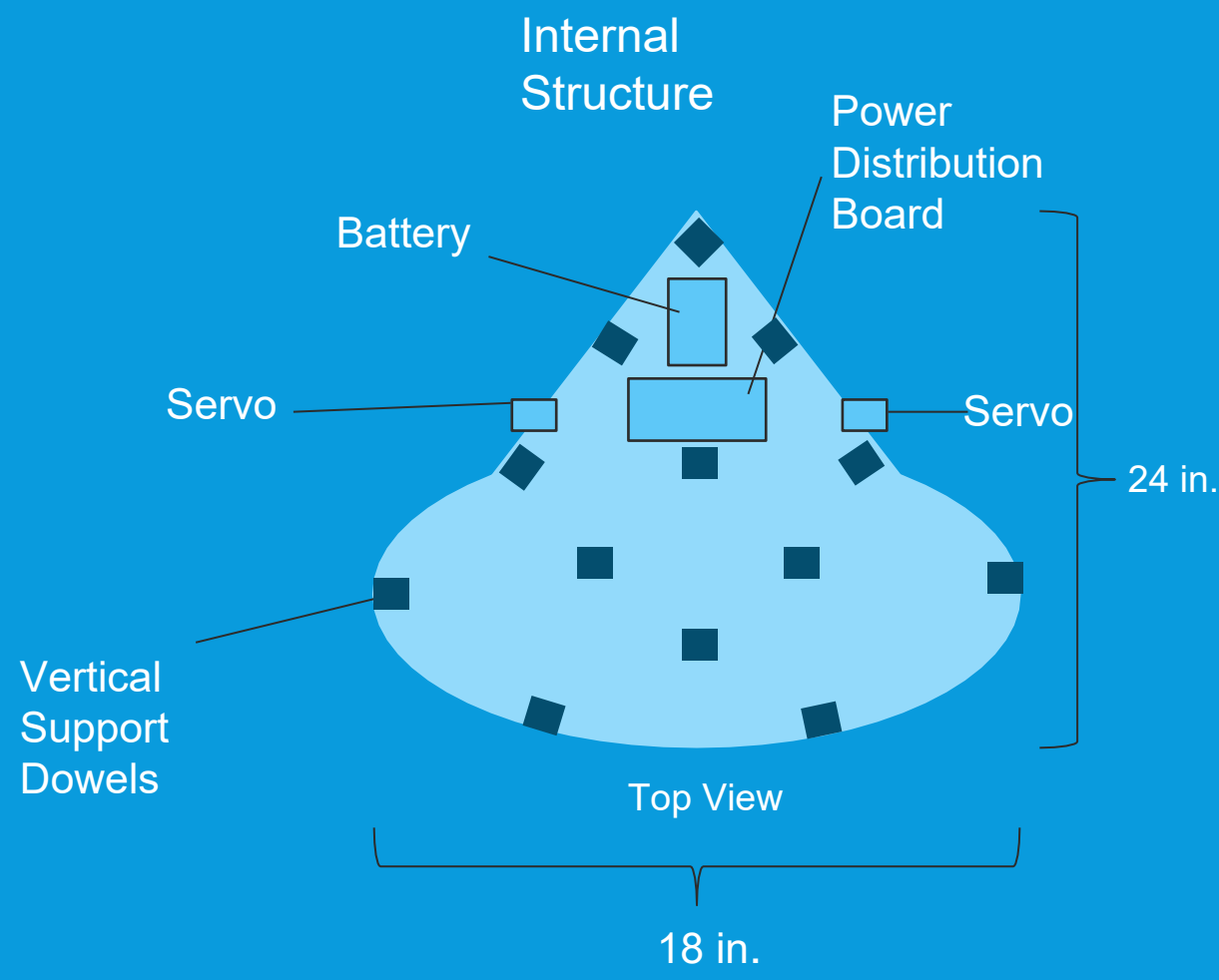
Woo

Item (in)	Cost (G)	Weight (g)
0.5x0.5x36	1.10	16.6
1x0.5x36	1.70	32.1
6x0.125x36	28.74	230.6
2x0.03125x36	0.96	4.3
3x0.03125x36	2.30	13.3
1x1x36	2.91	82.6

	Budget	Used	Buffer	Net Left
Cost	1500G	632.8G	63.3G	804.0G
Weight	1000g	910.5g	45.5g	44.0g

STRUCTURE STRATEGY

- Body of the craft made of Balsa Wood
- Utilize a skeletal structure to reduce weight while providing strength
- Vertical supports are placed throughout the body
- Balance the size and weight of the craft by making it relatively flat
- Majority of electronics at the front to balance the weight of the back
- Anchor points placed in a triangle around the craft

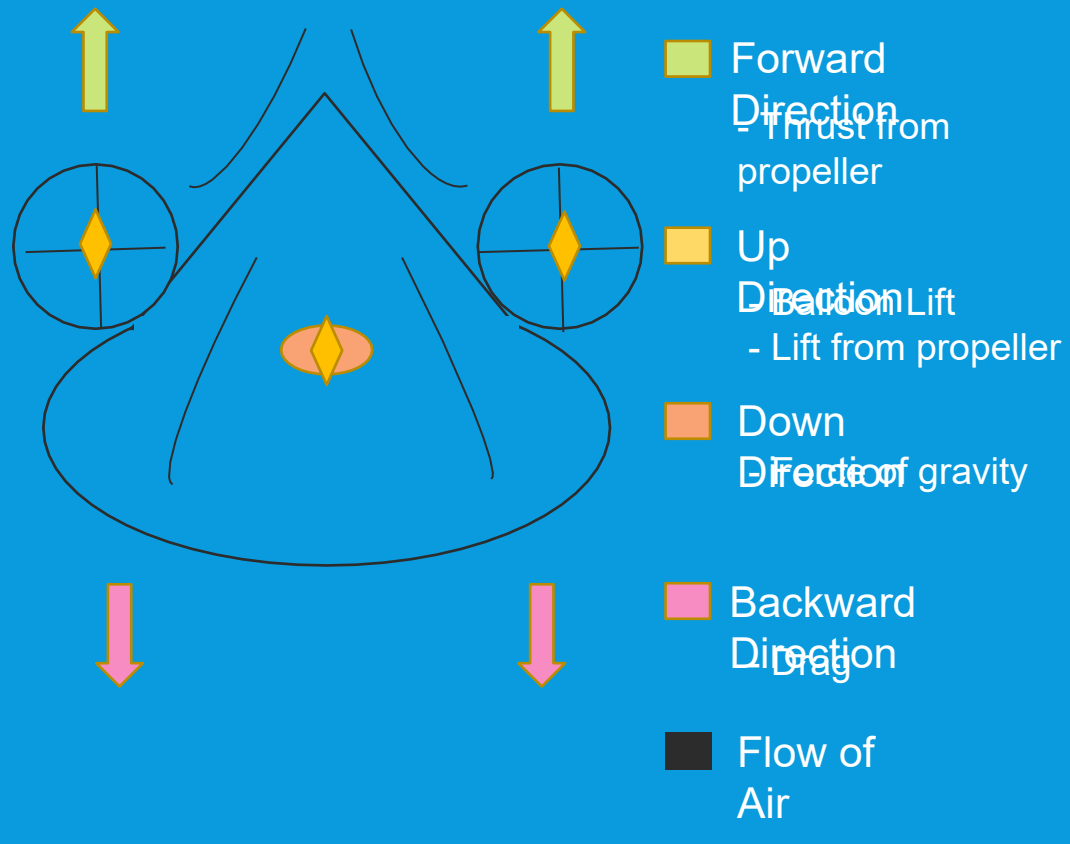


AESTHETICS

- Color palette replicates the themes of the show
- The top of the aircraft will be white/silver like the lighting on the stage, with blue accents
- The bottom half of the aircraft will be blue and black
- Nine circles will represent the nine contestants
- The body of the aircraft will mimic the shape of the stage.

AERODYNAMICS

- Forces to consider
  - Drag on the body of the craft
    - Want to minimize this
  - Weight of the craft
    - Sweet spot
  - Lift of the craft
    - Provided by propellers and balloon
  - Thrust of the craft
    - Provided by the servos rotating propellers
- Design choices regarding aerodynamics
  - Rounded sides to allow air to flow easily
    - Allows easier horizontal maneuverability
  - Flat top and bottom
    - Allows for increased stability on the Y axis of motion

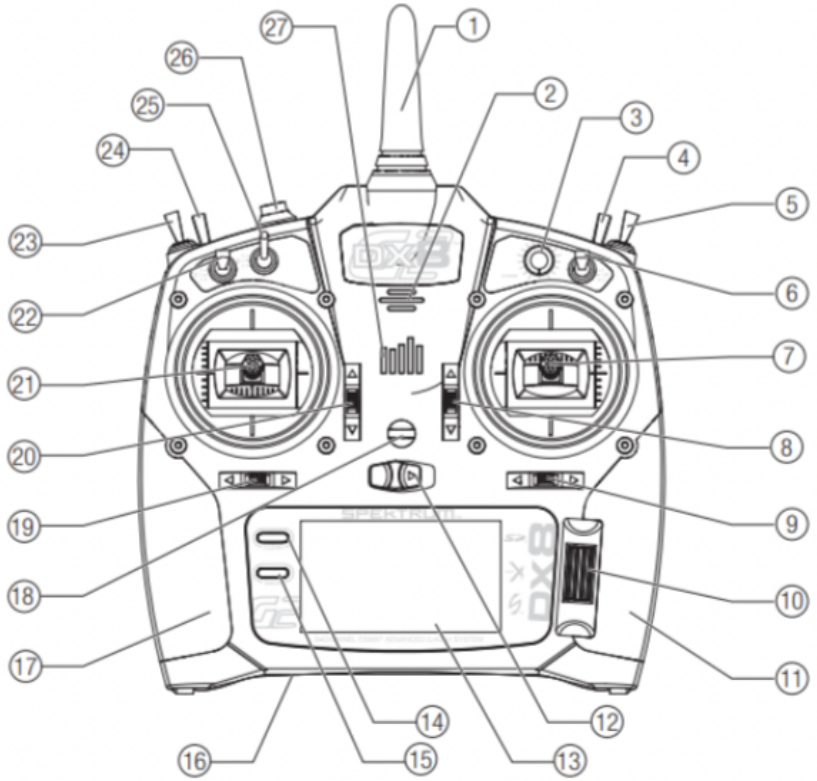


PROPULSION

- **Strategy**
- The Craft will use a balloon to lift 730g of its mass
- The remaining upward thrust will come from 2 maneuverable motors (200g Thrust)
- The two motors will be able to rotate forward, giving the craft control along a flat plane
- **Integration**
- The motors will be held to the craft using servos attached to the motors' shroud
- **Propulsion to Balance**
- Goal to set the motors in line with Center of Gravity
- Use internal electronics to move center of gravity

CONTROLS

- Counter-rotating propellers
- Three-axis control is accomplished
  - Left and right turning by adjusting thrust direction
  - Up and down lift by thrust magnitude
- Control 7 will be used to control the right servo.
- Control 21 will be used to control the left servo.
- Control 10 will be used to speed up and slow down the motors.



TEST PILOT

Flight Test Strategy

- Small adjustments to flight path to maintain stable flight

Pilot Training

- Practice utilizing the controls to maintain vertical lift

Assessing Vehicle Flyability

- The vehicle will be considered flyable if able to maneuver while preserving stability

CRAFT MANUFACTURING

- **Difficulty of Manufacturing the Aircraft**

  -Placement for pivoting servos to allow rotation of props.

  -Finding the right center of gravity; placing the battery in the front if back is too heavy

- **Difficulty of Maintaining the Aircraft**

  -Check how well the wood glue is holding the wood pieces together.

  -Make sure the shrouds keep the propellers protected, and make sure that the propellers are in good condition

- **Aesthetic Integration**

  -Shape of the craft will be in the shape of the stage from the show "The Weakest Link"

  - Paint job will reflect the theme colors of the show

QUESTIONS?