

FLYING HIPPO:

Completed Design Review

Tyler Callahan - *structures*

Daniar Hussain - *electronics*

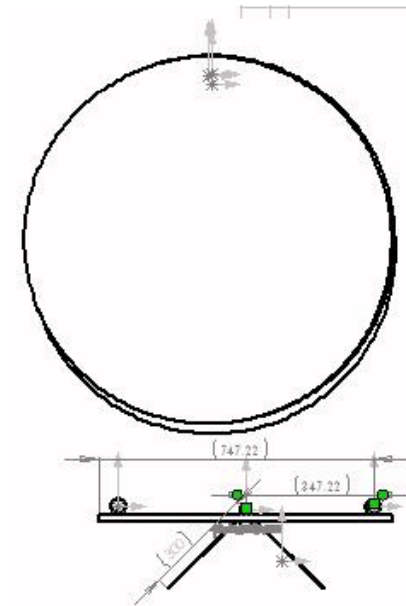
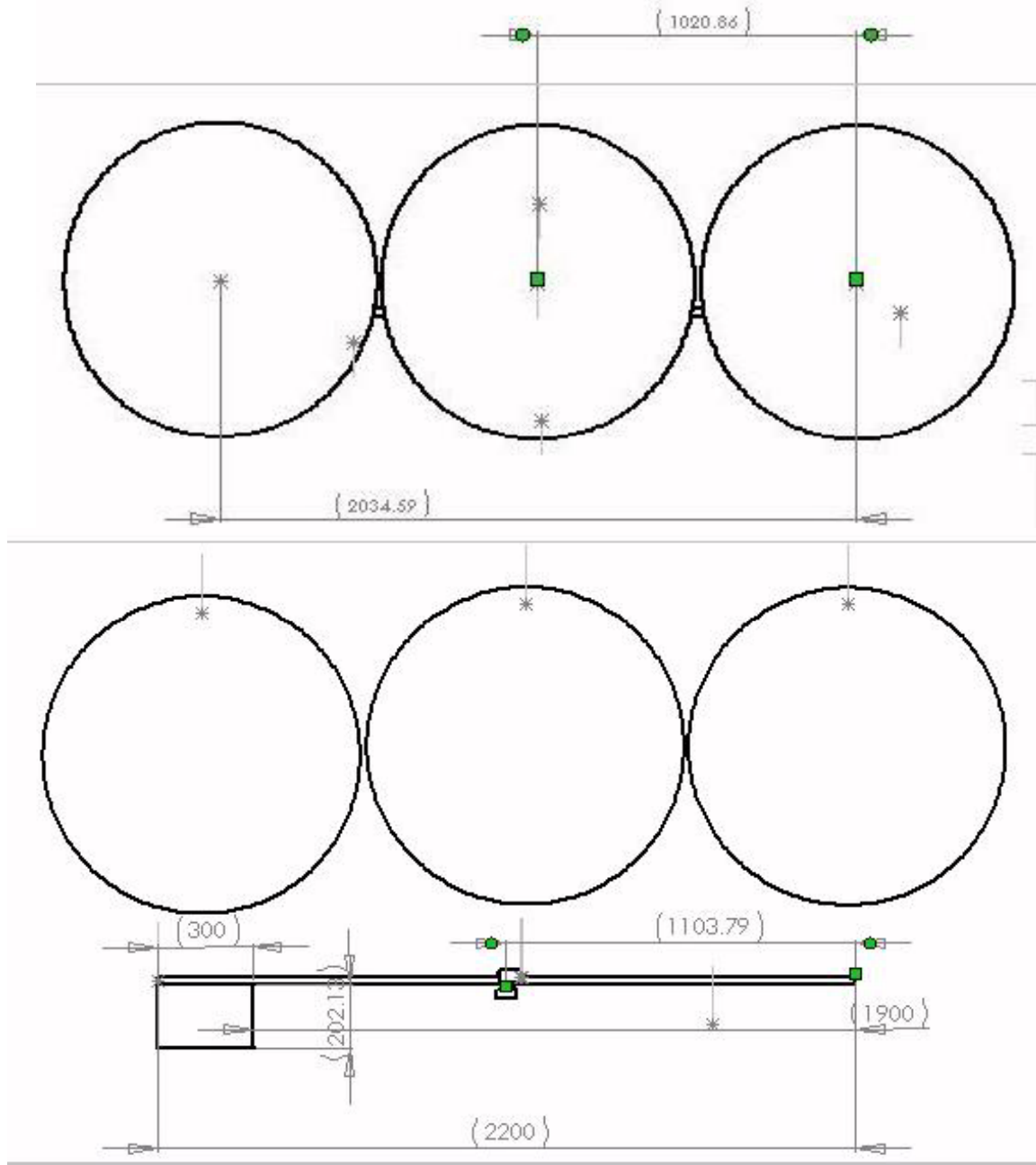
Gabi Lopez-Betanzos - *electronics*

JoHanna Przybylowski - *structures*

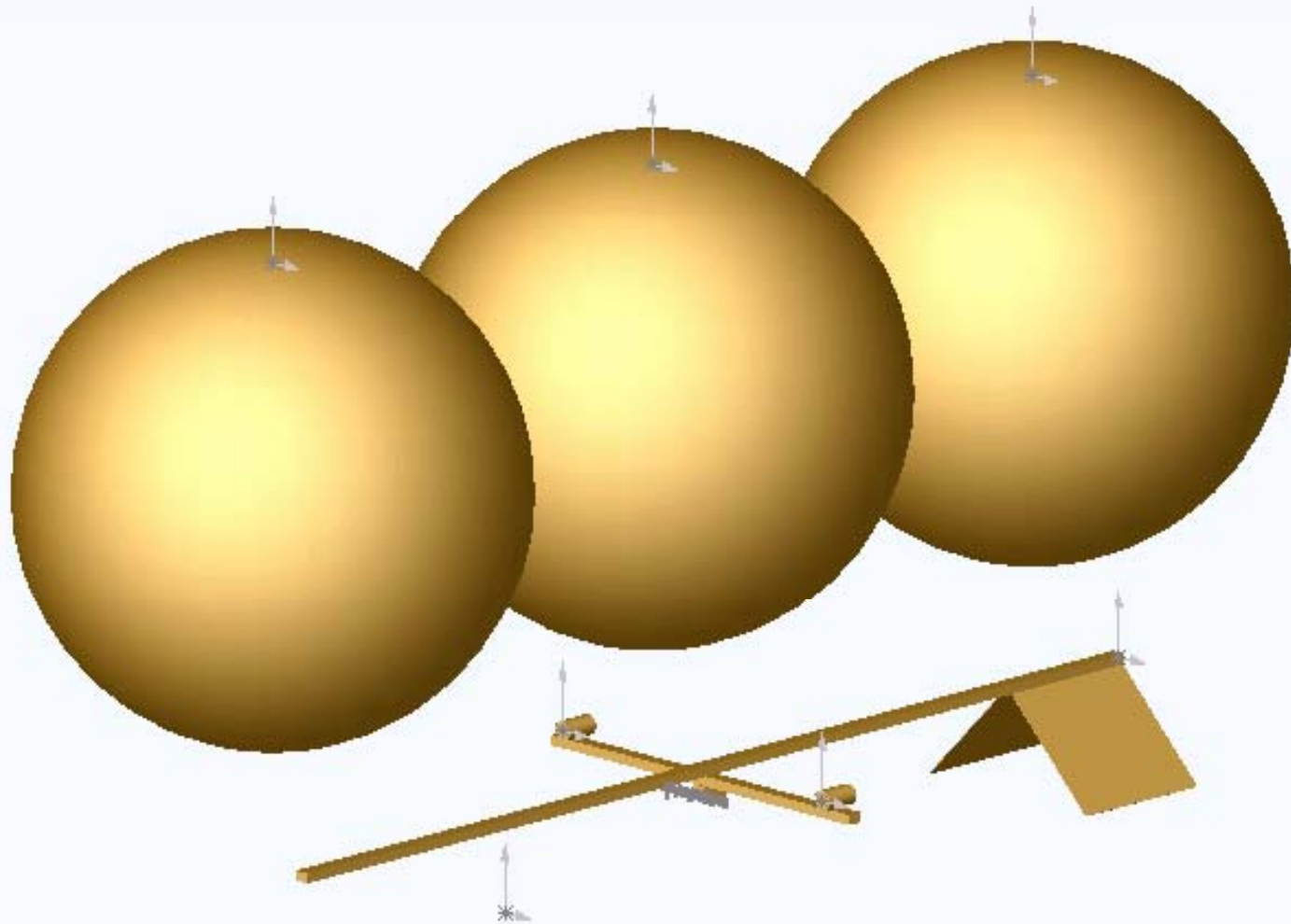
flying_hippos@mit.edu



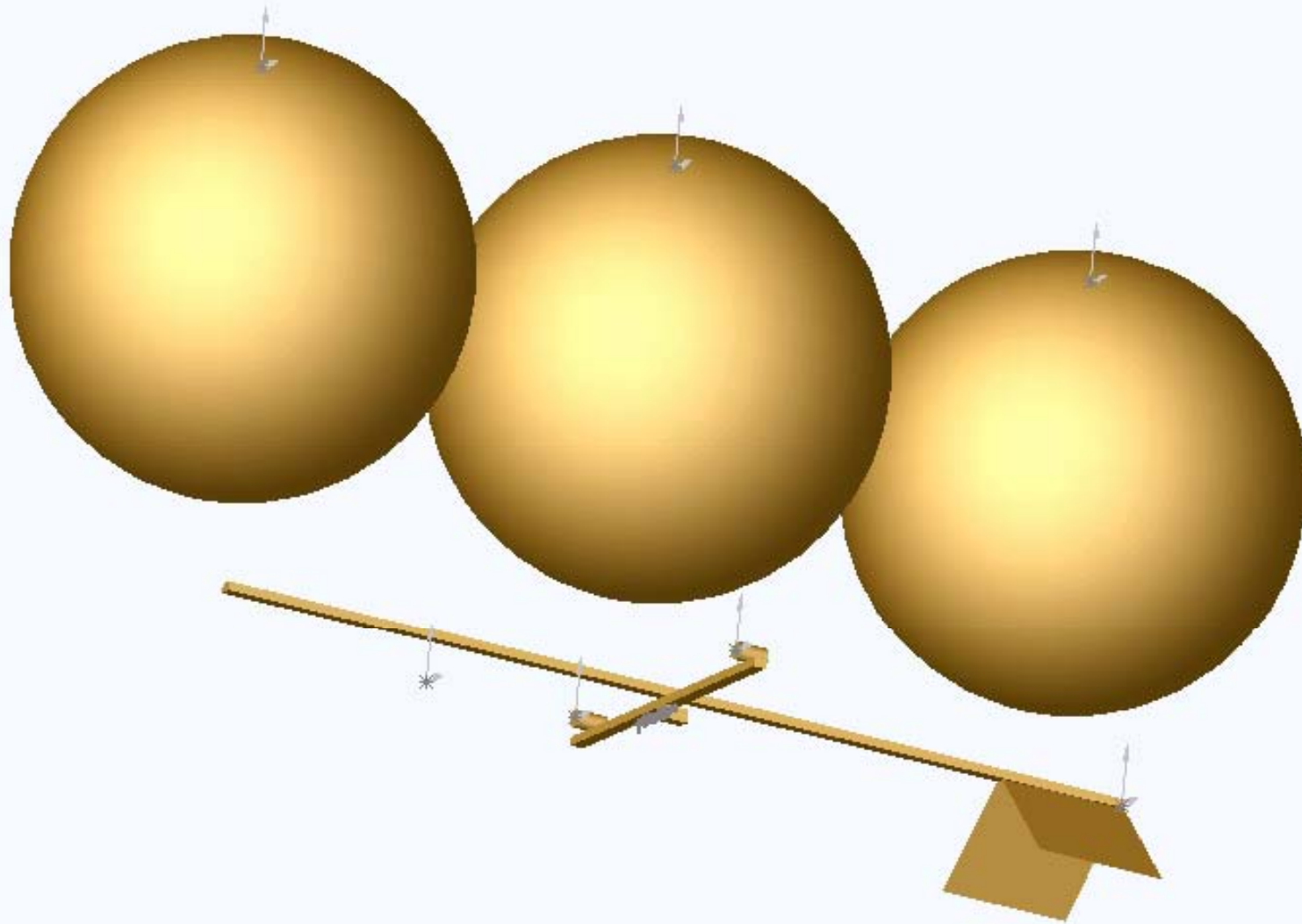
Schematic of Final Design



Solid Model of Selected Design

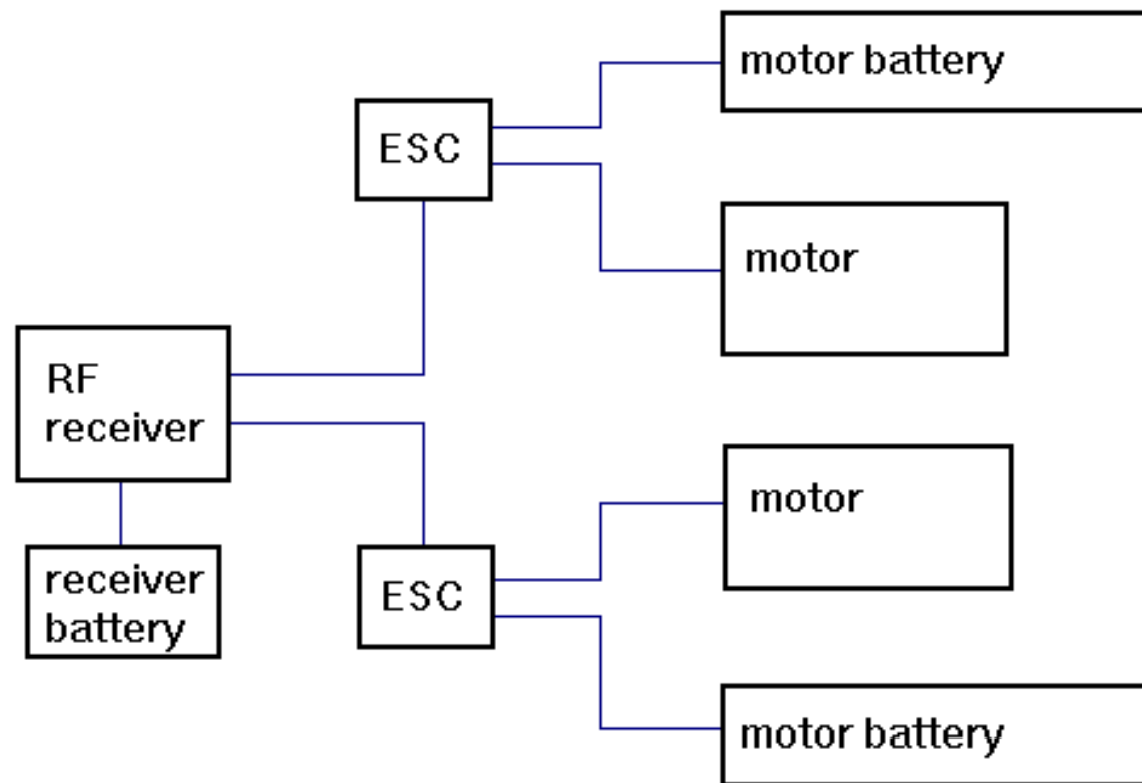


Solid Model of Selected Design



Control system details

Differential thrust



Aerodynamic Analysis – Lift

◆ Three Balloons = 1.6 m³ of helium
(fixed)

◆ Maximum Mass

$$\begin{aligned} &= \text{Lift/g} = (\rho_{\text{air}} - \rho_{\text{helium}}) * V \\ &= \mathbf{1600 \text{ g}} \end{aligned}$$

Technical Analysis – Steady State

◆ Max thrust from two large engines =
 $2 * 0.88 \text{ N} = \mathbf{1.76 \text{ N}}$

◆ $T = D = 0.5 * \rho_{\text{air}} * v^2 * S * C_D$

Let $C_D = 0.9,$

Then $v_{\text{max}} = [2 * T / (\rho_{\text{air}} * S * C_D)]^{1/2}$
 $= \mathbf{2.0 \text{ m/s}}$

$v_{\text{approx}} = 1.2 \text{ m/s}$

◆ Time to complete race @ $v_{\text{approx.}} = 1.5 \text{ min.}$

Technical Analysis – Endurance

- ◆ Endurance = batt. charge (mAh) / current (A)
min. endurance = 23 min.
approx. endurance = 45 min.





(assuming resistance of wires and ESCs are negligible)

- ◆ Estimated mass/time = 152 g / 91 s = 1.67 g/s

Technical Analysis – Vehicle Mass

◆ Batteries (8 cell x 2)	302 g
◆ Engines (large x 2)	445.4 g
◆ Propellers (x 2)	18 g
◆ Balloons (x 3)	210 g
◆ Electronics (total)	222.6 g
◆ Structures (estimate)	250 g
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◆ Total Estimate	1448 g
◆ Payload Estimate	152 g

Proposed Schedule

	21-Apr	28-Apr	5-May	12-May
Final structure assembly				
Electronics assembly and testing				
Final Assembly				
Debugging				
Trial Day			◆	
Race Day				◆
Design Portfolios				◆