



4<sup>th</sup> Design Iteration

Team Name: الثَّريَّا

□Note: lengths should be in (cm), angles in (deg).

Wing Information	
Airfoil	Selig 1223
Span	146 (cm)
Root Chord	26 (cm)
Tip Chord	26 (cm)
Offset	10 (cm)
$AR$	5.62
$S_w$	3800 (cm <sup>2</sup> )
Incidence Angle	-4
Twist	0
Dihedral	4 (deg)
Vertical Tail Information	
Airfoil	NACA 0004
Semi Span (Total Length)	18 (cm)
Root Chord	20 (cm)
Tip Chord	14 (cm)
Offset	6 (cm)
$S_v/S_w$	0.068182
$AR_v$	4.71
$V_v$	0.0680562
Incidence Angle	0
Tail Arm	65 (cm)
Shifted Length in Z-Direction	-7 (cm)
Horizontal Tail Information	
Airfoil	NACA 0004
Span	56 (cm)
Root Chord	20 (cm)
Tip Chord	20 (cm)
Offset	0
$S_H/S_w$	0.2895
$AR_H$	2.8
$V_H$	0.724
Incidence Angle	-5.0 (deg)
Tail Arm	65 (cm)
Shifted Length in Z-Direction	-9 (cm)

# Propulsion System Information

Input					
Model Weight (Drive included or without)	2100g include drive				
Desired Flight speed	44.3 km/h				
Brushless Motor	Manufac turer	Model	Voltage Constan t [KV]	No Load Current [A]	Resistanc e [ohm]
	ElectriFly	RimFire 0.15	1200	1.7	0.0415
Battery	Manufac turer	No. Of Cells	Voltage	Capacity [mAh]	C-Rating
	HRB	3	11.1	5200	50
Propeller Size (Diameter x Pitch)	10 x 4.7 in.				
Speed Controller (Current Rating Value)	60A				
Output					
Load	6.7 C				
Mixed flight Time	10.5 min				
Max. Current	33.43 A				
Max. Power	383.4 W				
Static Thrust	1618 g				
Available Thrust [at the desired flight speed]	1151 g				
Drive Weight	636 g				
All Up Weight	2100 g				
(Power/Weight) Ratio [Watt/lb]	85 W/lb - 187 W/kg				
(Thrust/Weight) Ratio	0.77				

# Flight Phases

Phase 1 (payload isn't deployed)	
MTOW	2.3 (Kg)
$X_{CG}$	12.5 (cm)
Static margin (%)	0.2
$CL_{Cruise}$	0.055745
$V_{Stall}$	700 (cm/s)
$V_{Cruise}$	1350 (cm/s)
$\alpha_{Trim}$	-0.615 (deg)
Required Static Thrust	1334.12 (g)
Required Dynamic Thrust (at $v_{Cruise}$ )	207.472 (g)
Phase 2 (payload is deployed)	
Mass	1.7 (Kg)
$X_{CG}$	12.5 (cm)
Static margin (%)	0.2
$CL_{Cruise}$	0.055745
$V_{Stall}$	650 (cm/s)
$V_{Cruise}$	1160 (cm/s)
$\alpha_{Trim}$	-0.615 (deg)
Required Static Thrust	1334.12 (g)
Required Dynamic Thrust (at $v_{Cruise}$ )	116.99 (g)

## Very Important Notes

The wing is actually above the cg of the UAV by 9cm, and the tail is at the same level of the cg, or you can say the wing is at zero and both the tail and the cg is below by 9cm.