Solis Fur (Sun Thief)

F1820 Solar Plane

The Team

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(Project Manager)

Michael Broyles
(Website Designer)

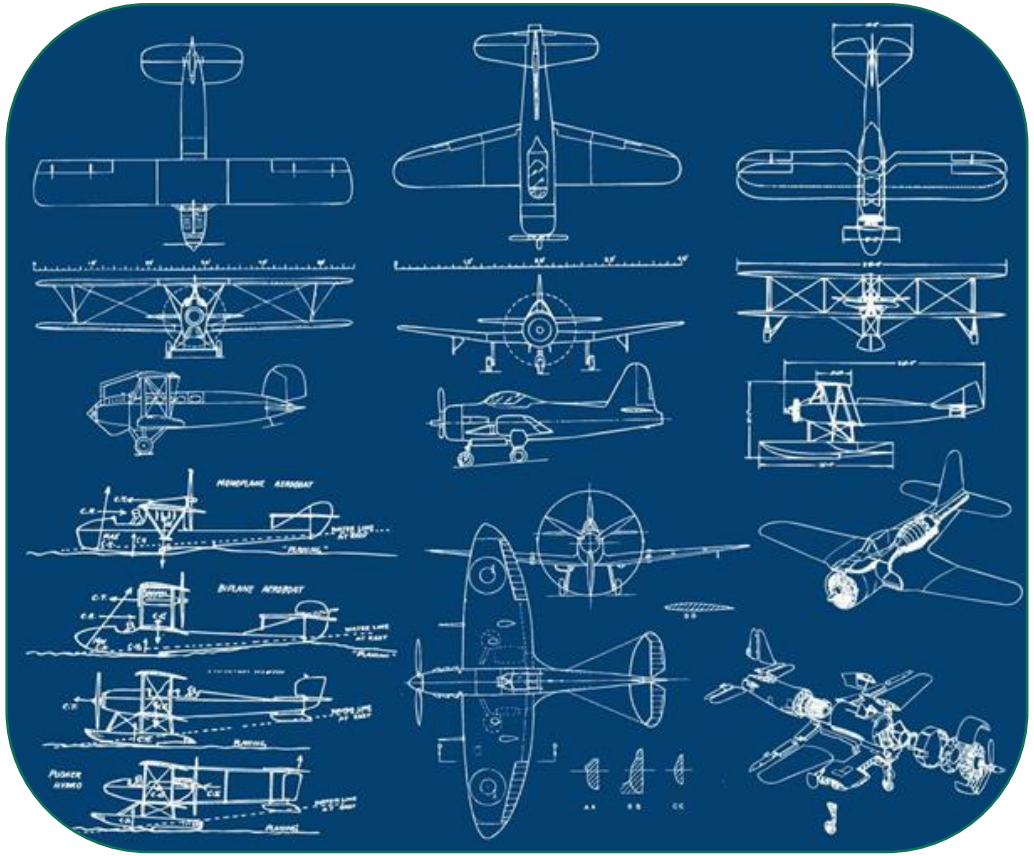
Nathan Zufelt
(Budget Manager)

Ethan Smith
(Client Contact)

Jonathan Hernandez
(Documentation Manager)

Project Concept

Explore the use of engineering principles to design and build a solar powered RC aircraft capable of sustaining indefinite flight while the sun is out.



Plane Schematic [8]

Project Sponsor / Customer

David Trevas, PhD

- Provided customer requirements.
- Crucial inputter in design requirements.

Additional Sponsors to come…

Why is this important?

- Teaches students to use engineering principles in a real life application.
- Allows the use of renewable energy to power an RC plane.

Background & Benchmarking

Solar Impulse 2

- Wing span: 72M
- Weight: 2.3 tons
- Flight duration: 5-6 days
- Number of solar cells: 17,000

Solar Impulse 2 [1]

Flight Path of Solar Impulse 2 [2]

Background & Benchmarking

RCTestFlight - V3

- Wing span: 10.5ft
- Weight: 5lbs
- Number of solar cells: 44
- Flight duration: 6hrs

RCTESTFLIGHT - V3 Solar Plane [3]

Background & Benchmarking

ULSA Current Design - HELIOS 2016 NAU Capstone Project

- Wingspan: 8 ft
- Chord Length: 12.5 in
- Aspect Ratio: 8.35
- Flight time: N/A
- Number of solar cells: 36

2016 Solar Capstone Team [4]

Customer and Engineering Requirements

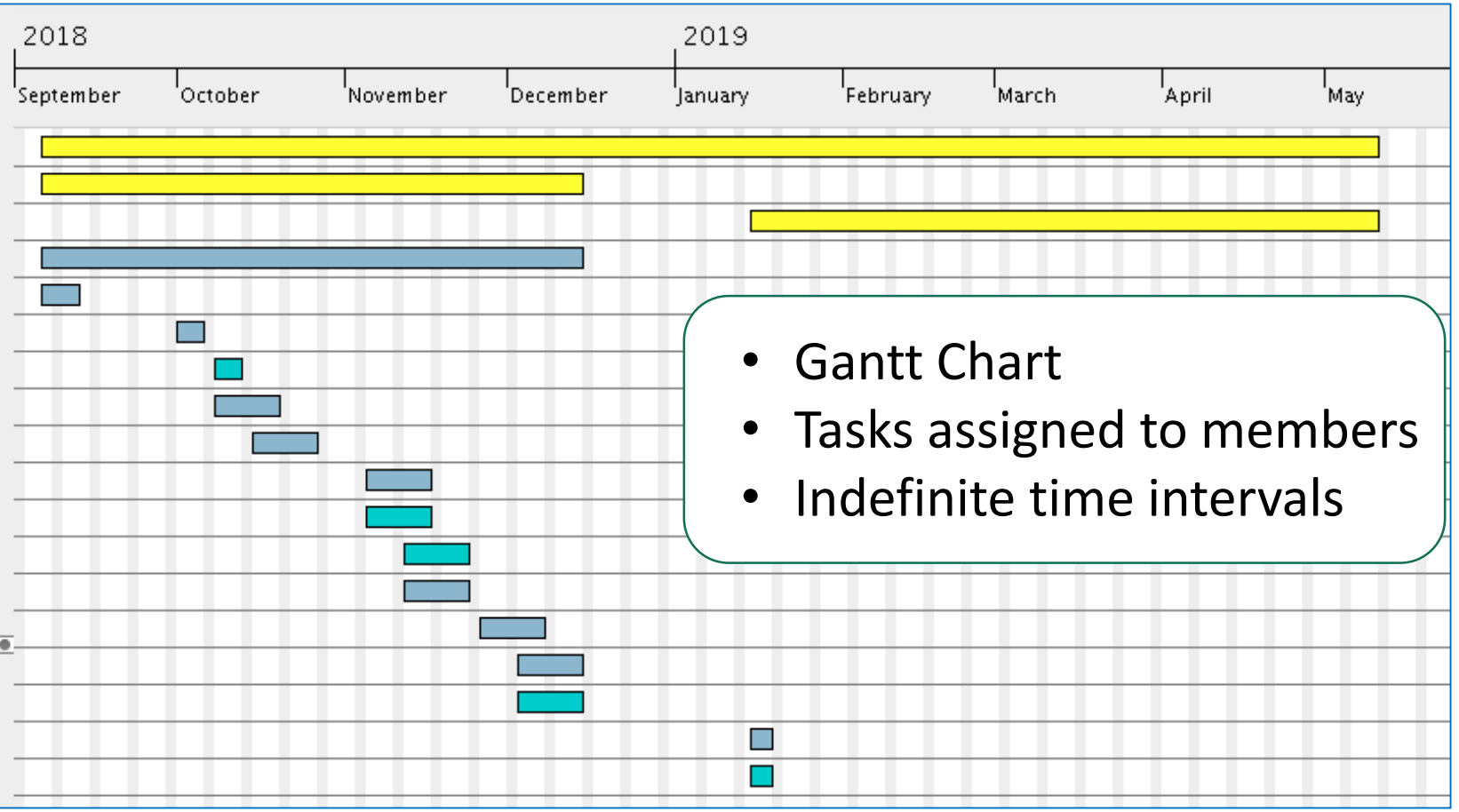
Customer Requirements	Engineering Requirements
Indefinite flight while sun is out	Minimal Weight Panel Output Aspect Ratio Lift
Data collection	Data Logging Solar Output Voltage Current
First Person View(FPV)	Video Transmission

Customer & Engineering Requirements

House of Quality (HoQ)									
Customer Requirement	**Weight**	**Engineering Requirement**	Weight	Time of Assembly	Battery Charge	Panel Output	Data Logging	Aspect Ratio	Lift
Durability	5		9	3	1	1	1	3	3
Easy Assembly	5		9	9	1	1	1	3	1
Sustainable Flight	20		9	3	9	9	1	9	9
Power Generation	25		9	1	9	9	3	1	1
Data Collection	10		1	1	9	9	9	1	1
Stability	5		9	3	1	1	1	9	3
Fly	30		9	1	9	9	1	9	9
Units			**lb**	**min**	**V**	**W/m^2**		**m/m**	**lb**
Absolute Technical Importance (ATI)			820	200	780	780	230	560	520
Relative Technical Importance (RTI)			1	7	2	2	6	4	5
Target ER values			<10	<10	14.7	150		13:01	>10
Tolerances of Ers			+-2	+-5	+-2	+-30		+-1	+-2
Testing Procedure (TP#)			2	7	6	1	5	4	3

Schedule

Name	Begin date	End date
Research	9/6/18	5/10/19
Design	9/6/18	12/14/18
Build	1/15/19	5/10/19
Meet the TA	9/6/18	12/14/18
Team Charter	9/6/18	9/12/18
Website Check 1	10/1/18	10/5/18
Peer Evaluation 1	10/8/18	10/12/18
Analysis Memo	10/8/18	10/19/18
Preliminary Report	10/15/18	10/26/18
Website Check 2	11/5/18	11/16/18
Analytical Report	11/5/18	11/16/18
Peer Evaluation 2	11/12/18	11/23/18
Final Report	11/12/18	11/23/18
Prototype, BOM, Cad	11/26/18	12/7/18
Website Check 3	12/3/18	12/14/18
Peer Evaluation 3	12/3/18	12/14/18
Post Mortem	1/15/19	1/18/19
Individual Analytical Analysis	1/15/19	1/18/19



- Gantt Chart
- Tasks assigned to members
- Indefinite time intervals

Budget

- Materials - $1000
  - Solar panels
  - Carbon fiber
  - Clear Ultracote film
- Plane Electronics - $500
  - Motor
  - Battery
  - Servos
  - Charge controller
- Control Equipment - $1000
  - Controller
  - FPV system
  - Camera
  - Data logger
- Total budget - $2500

	Price	Quantity	Units	Cost	Price per unit	Weight per unit	Units	Total Weight	Weight (lbs)
Plane Components									
C60 Solar panels	$360.00	1	80	$360.00	$4.50	10	grams	800	1.76
Sunpower dog bone connector	$9.99	2	100	$19.98	$0.20			0	0.00
Carbon Tail tubing (0.793 x 72in)	$225	1	1	$224.99	$224.99	1.02	lbs	1.02	1.02
Carbon Wing struts (0.38 x 72in)	$70	4	4	$279.96	$69.99	131.5	grams	526	1.16
Carbon Sheets (200x300x2mm)	$20	10	10	$198.60	$19.86	97	grams	970	2.14
Clear UltraCote	$29	3	3	$87.00	$29.00	36.61821	grams	109.85463	0.24
OS 10 motor	$89	1	1	$89.00	$89.00	102	grams	102	0.22
Zeee 3S Lipo Battery 11.1V 50C 5200mAh	$37	1	1	$36.99	$36.99	11.6	oz	11.6	0.73
Place holder (Servos)									
Tunigy Speed Controller	$96	1	1	$96.00	$96.00	60	grams	60	0.13
Place holder (Propeller)									
Place holder (Tail wing?)									
Ground Equipment									
FrSky Taranis X9D Transmitter	$234	1	1	$234.00	$234.00			0	0
FrSky Taranis Compatible Receiver X8R 8-	$35	1	1	$34.50	$34.50			0	0
FrSky X4RSB 3/16CH Telemetry Receiver	$32	1	1	$31.99	$31.99			0	0
Connex ProSight HD Vision Pack	$399	1	1	$399.00	$399.00	66	grams	66	0.15
Zeee 3S Lipo Battery 11.1V 50C 5200mAh	$37	1	1	$36.99	$36.99	11.6	oz	11.6	0.73
			Total	$2,129.00				Total Weight	8.28

[5] [6] [7]

References

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