TARC Team 19-5181

Mayilan Thanigai, Sofia Guardado, Kara Chatterton, and Cole Sherling

Meet the Team

Mayilan Thanigai (leader) - 12th Grade at Wootton HS,

Rockville MD, third year

Sofia Guardado - 10th grade at Rockville HS, Rockville
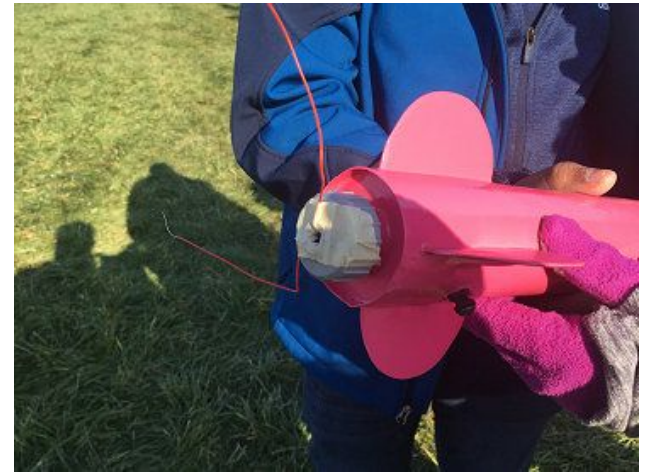
MD, first year

Kara Chatterton - 10th grade at Rockville HS, Rockville

MD, first year

Cole Sherling - 10th grade at Whitman HS, Rockville MD,

first year

The Rocket Designing Process

- Research

- Design

- Simulate

Constraints

2019 RULES

September 1 Updated Version

TEAM AMERICA ROCKETRY CHALLENGE

Commemorating the 50th anniversary of Apollo 11 and the 100th anniversary of the Aerospace Industries Association

In order to qualify for TARC nationals this year, we needed to design and build a rocket with the following constraints in mind:

- The rocket's mass must not exceed 650g
- The rocket's length must not exceed 650mm
- The cargo of the rocket must consist of three eggs, unharmed post-landing
- Two alike parachutes, without tangling, must be used to return the cargo back to the ground safely
- The rocket must be airborne from 43-46 seconds after clearing the launch rail
- The rocket must reach a target altitude of 856 feet above the altitude of launch

Design - OpenRocket

Rocket
Length 71.9 cm, max. diameter 5.63 cm
Mass with motors 503 g

Stability: 1.79 cal
CG:36.2 cm
CP:46.3 cm
at M=0.30
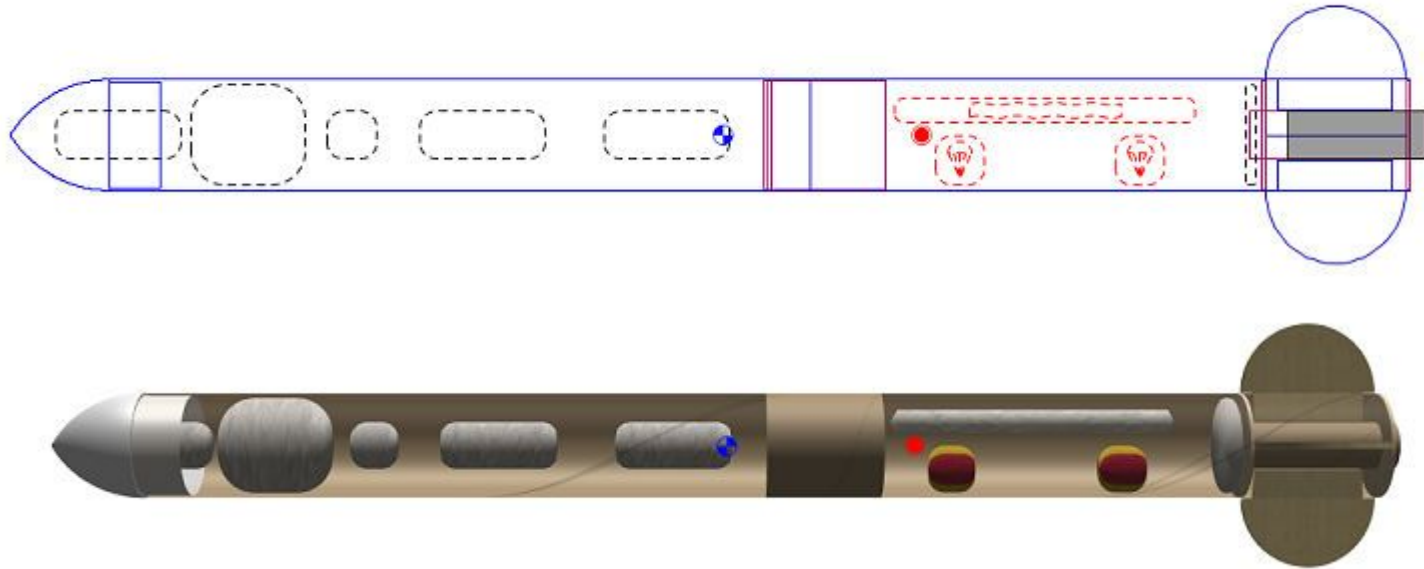
Simulation

We used Open Rocket to refine our motor selection.

We decided on Aerotech reloadable F39-6T
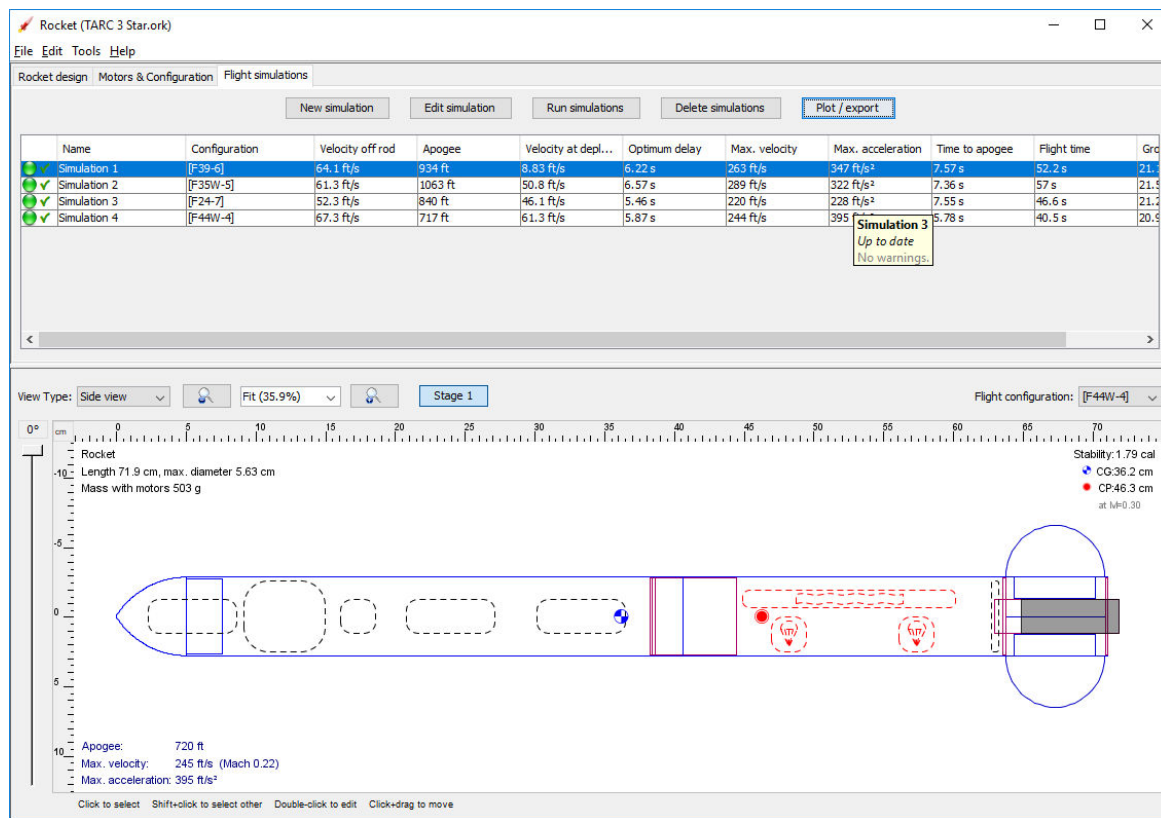
Construction

September 19-November 7

    1st Rocket Man

February 16-March 20

    2nd Aurum vitae montis

Rocket Man

- BT-70 Body Tube #1- Cargo
  - Cargo length: 35.6cm
  - Cargo Inner Diameter: 5.54cm
  - Cargo Outer Diameter: 5.63cm
  - Cargo Mass: 30g

- BT-70 Body Tube #2- Booster
  - Booster length: 30.5cm
  - Booster Inner Diameter: 5.54cm
  - Booster Outer Diameter: 5.63cm
  - Booster Mass: 60g

Flight Graphing

Pink Rocket Flights 190324 - Targets: 856ft, 43-46sec

Flight Data

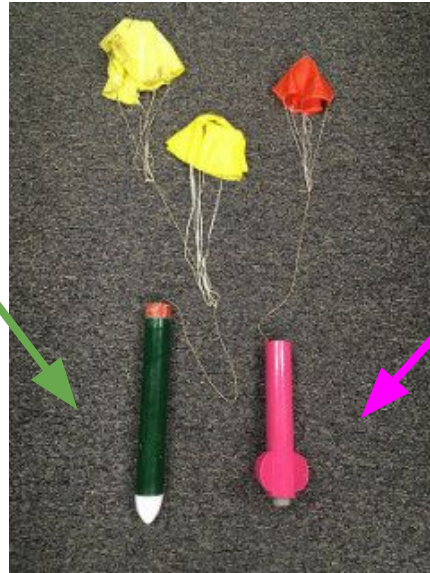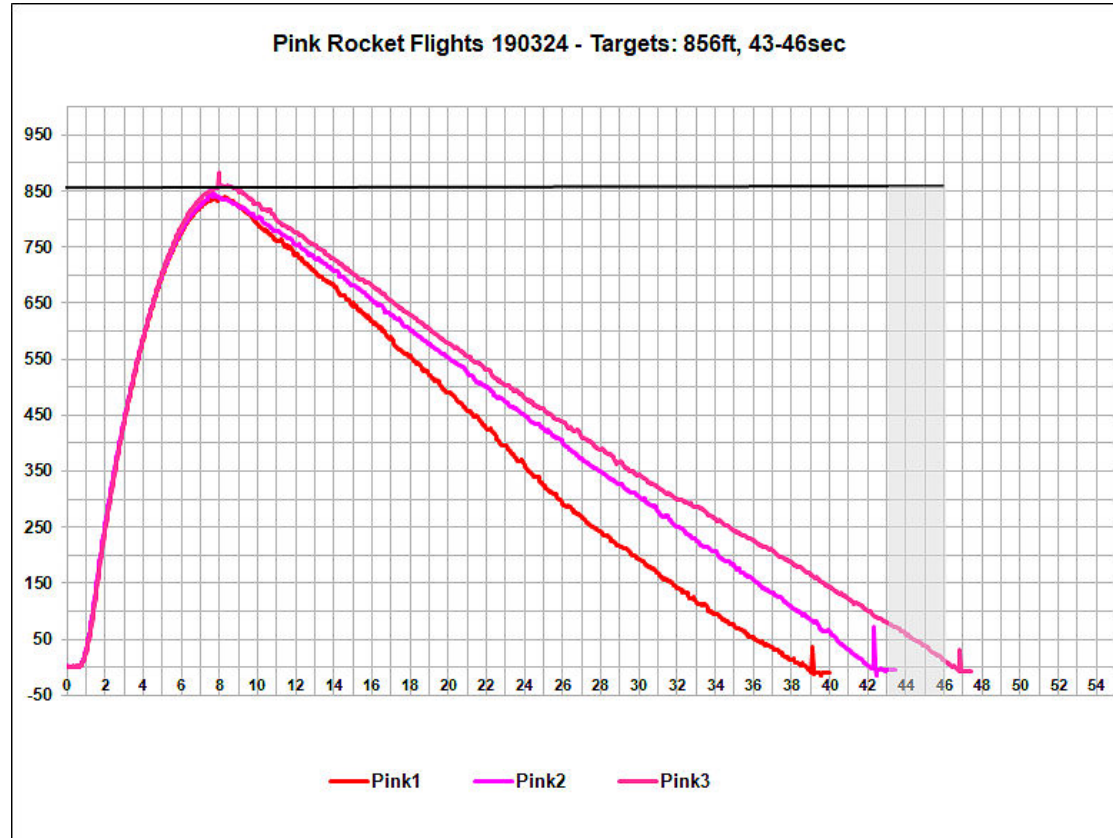|	Date	Team	Rocket	Flight	Motor/Lot/Pack	Weight	Alt	Recovery	Altitude	Time	Comment	DQ
1	Date	Team	Rocket	Flight	Motor/Lot/Pack	Weight	Alt	Recovery	Altitude	Time	Comment	DQ
2	11/17/2018	5181	Pink (video-8459)	1	F39-6	477g	13	2-15"/12"	918ft	48ec	straight, chutes OK, too high	
3	11/17/2018	5181	Pink (video-8466)	2	F44-8	477g?	13	2-15"/12"	823ft	39sec	straight, chutes OK	
4	12/8/2018	5181	Pink (video-8550b)	1	F39-6	498g	13	2-15"/12"	879ft	45ec	straight, booster chute not deployed, score 23	1
5	12/27/2018	5181	Pink (video-8629)	1	F39-6	504g	13	2-15"/12"	849ft	43sec	nice flight, score=7	
6	12/27/2018	5181	Pink (video-8640)	2	F39-6	507g	13	2-15"/12"	846ft	41sec	nice flight, score=18	
7	1/28/2019	5181	Pink (video-8793)	1	F39-6 04091808	505g	13	2-15"/12"	850ft	50sec	nice flight, chute tangled	1
8	1/28/2019	5181	Pink (video-8810)	2	F39-6 xxxx	503g	13	2-15"/12"	892ft	48sec	ok flight, too high	
9	2/23/2019	5181	Pink (video-8883)	1	F39-6 04091808	506g	13	2-15"/12"	865ft	45sec	nice flight, score=9	
10	2/23/2019	5181	Pink (video-8899)	2	F39-6 11191804	509g	13	2-15"/12"	851ft	45sec	nice flight, score=5	
11	3/2/2019	5181	Pink (video-8922)	1	F39-6 04091808 3	508g	13	2-14"/10"	808ft	41sec	nice flight, low, igniter issue	
12	3/2/2019	5181	Pink (video-8955)	2	F39-6 04091808 3	494g	13	2-14"/10"	877ft	51sec	nice flight, high, slow descent	
13	3/24/2019	5181	Pink (video-9033)	1	F39-6 04091808 4	505	13	2-14"/10"	838	39sec	nice flight, some tangle	
14	3/24/2019	5181	Pink (video-9041)	2	F39-6 04091808 4	500	13	2-14"/10"	845	41sec	nice flight, score=16	
15	3/24/2019	5181	Pink (video-9056)	3	F39-6 04091808 4	496	13	2-14"/10"	860	45.88	nice flight, Q1 score=4	
16	3/30/2019	5181	Pink (video-9070)	1	F39-6 04091808 7	503	13	2-14"/10"	824	39sec	nice flight, low	
17	3/30/2019	5181	Pink (video-9080)	2	F39-6 04091808 7	494	13	2-14"/10"	868	47.00sec	nice flight, Q2=16	
18	3/30/2019	5181	Pink (video-9085)	3	F39-6 04091808 7	498	13	2-14"/10"	805	39.66sec	strange flight, Q3=64.36	
19												
20												

Lessons Learned

- Fly early and often - 17 flights.
- Keep it simple.
- Record lots of data.
- Open Rocket can't simulate Booster and Cargo coming down separate.
- Simulations were higher than actual flights.
- We fixed the tangled chute issue.