Mini-MAV Student Launch

Project Ares

University of Central Florida

4000 Central Florida Boulevard,

Orlando, Florida, 32816

Table of Contents

General Information

1.2 Adult Educators

-Dr. Justin Karl, Professor of Mechanical Engineering
Justin.Karl@ucf.edu

-Dr. Seetha Raghavan
Seetha.Raghavan@ucf.edu

1.3 Safety Officer

-Diego Ospina, Senior, Aerospace Engineering
Diego_o@knights.ucf.edu
813-785-4382

1.4 Team Lead

-Daniel Garcia, Senior, Aerospace Engineering
Dny1993@knights.ucf.edu
786-427-4057

1.5 Participants

Daniel Garcia
Senior, Aerospace Engineering
Team Lead

Diego Ospina
Senior, Aerospace Engineering
Safety Officer

Emily Judd
Senior, Aerospace Engineering and Music Performance
Media and Fundraising

Chris Blizzard
Senior, Aerospace Engineering
Propulsions System

Jeremy
Senior, Aerospace Engineering
Outreach

Cody Pike
Senior, Aerospace Engineering
Structural System

Kristen Brightwell
Sophomore, Aerospace Engineering
Recovery System

Jordan Rosas
Senior, Aerospace Engineering
Robotics

Randy Lorenzo
Junior, Aerospace Engineering

Tristan Reynoso
Freshman, Mathematics
Structural System

Angelique Solano
Freshman, Forensic Science
Electronics

1.6 NAR sections

-NEFAR (NAR section #563, TRA Prefect #35)
-Spaceport (NAR section #342, TRA Prefect #73)

Facilities/Equipment

Members have access to the facilities offered to all CECS major students at UCF along with facilities offered exclusively to members of SEDS. UCF has a machine shop readily available to all students with sophisticated machining equipment such as industrial lathes, belt sanders, band saws, and milling machines along with a CNC milling machine and hydraulic press, supervised by a machine technician, Tim Linder, at all times; the machine shop's hours of operation are Monday through Friday 8:00AM- 5:00PM, phone number 407-823-2393. Engineering students have access to recently opened facilities: Innovation lab and Idea Lab. These recently opened facilities offer workspaces with whiteboards, power supplies, soldering kits, breadboards, electronic circuit supplies, CNC laser cutters, and a 3-D printer, all necessary for manufacturing a functioning AGSE. Access to the laser cutter and 3-D printer are supervised by a lab manager, Don Harper, during operation; the Innovation and Idea Lab's hours of operation are Monday through Friday 8:00AM to 5:00PM. Another facility readily accessible to engineering students is the design lab which is equipped with glues, cutting tools, drills, safety glasses, scroll saw, epoxy, carbon fiber working equipment, paint, and wood, necessary materials and workspace to build a rocket. Along with these hands-on facilities, students have access to multiple computer labs throughout campus with access to various computer labs equipped with vital software such as AutoCAD, RockSim, SolidWorks, Office Suite, and MatLab. The Harris Lab, a major computer lab, hours of operation are Monday through Friday 8:00AM-8:00PM, Saturday 9:00AM-6:00PM, and Sunday 1:00PM-6:00PM. The team will implement the Architectural and Transportation Barriers Compliance Board Electronic and Information Technology Accessibility Standards as stated in the NASA Student Launch Handbook.

Safety Plan

2.1 Safety Mentor

Anthony Laiuppa will be our primary safety mentor during the project at hand. Furthermore, USLI requirement of 15 successful dual deployment flights has been meet. Anthony Laiuppa will also oversee the safety officer elected for the project in which all safety procedures will be followed with exact precision.

2.2.1 Procedure for NAR/TRA Personal

Team member/s with NAR/TRA certification will be responsible for complying with NAR or Tripoli High Power Rocket Safety Code requirements. Along with complying with the NAR certification for launch, this member will be responsible for purchasing, storing, and handling the motor. This member/s will be the owner or co-owners of the rocket due to required insurance purposes. Certificated NAR/TRA team members will be responsible for the handling and monitoring of hazardous materials.

2.2.2 Hazardous Recognition and Accident Avoidance

Students will be informed of hazardous materials and steps for accident avoidance at the beginning of project development. Students will also be referred to laboratory safety guidelines when dealing with hazardous materials found in the Environmental Health and Safety (EHS) website http://ehs.ucf.edu/home.html. Prior to attending launch activity the team will be briefed on the hazards involved with rocket launch as well as given a list of safety codes which are to be followed.

2.2.3 Cautionary Plans, Procedure, and Documents

All safety procedure and documents will be outlined and explained to students in a meeting. In which students will be made aware of potential hazardous material as well as hazardous procedures. Students will also be informed on specific safety regulations and other safety information. Students will also be given following link that will lead them to the Personal Protective Equipment. http://ehs.ucf.edu/labsafety/LSM.pdf pg. 33-36

2.2.4 Compliance with Federal, State, and Local Laws

The team member in charge of safety will inform team members about federal, state, and local law regarding unmanned rocket launches and motor handling, with respect to:

1. Federal Aviation Regulations 14 CFR, Subchapter F, Part 101, Subpart C, Amateur Rockets
2. Code of Federal Regulation 27 Part 55: Commerce in Explosive; and fire prevention
3. NFPA 1127 "Code for High Power Rocket Motors."

2.2.5 Purchasing, Handling, and Transporting Rocket Motor

Team members with at least level 2 certification will be responsible for purchasing the rocket motor. The same team members are the only ones who will be allowed to handle the motor and its reloads. The motor and reloads will be stored in a fire safe cabinet in the home of one of the level 2 certified team members. When transporting the rocket motor, the certificated team member will make sure to obey by federal regulation for rocket motor transportation. The motor will be transported by car with a certified NAR/TRA member.

2.2.6 Safety Agreement

All safety agreements can be found in Appendix.

Technical Design

1. Rocket and Payload Design

a. The Rocket will be approximately 72 in. in length with a diameter of 4.02 in. There will be 3 breaks in this rocket design yielding 4 major sections: (1) drogue chute and motor, (2) Payload, (3) electronics and main chute, and (4) nose cone. A detailed schematic can be viewed in the figure placed below. The center of pressure was calculated to be at 56.753 in from the tip of the nose cone. The center of gravity was calculated to be 47.1712 in. from the tip of the nose cone. There are two 7-inch carbon fiber reinforced couplers connecting sections 1, 2, and 3. The total weight of the rocket with the payload inside was calculated to be approximately 80.6329 oz. with a margin of stability of 2.38.

The payload containment area in the rocket will be a separate sealed and protected canister attached to a parachute that can be readily jettisoned from the rocket at 1000 feet during descent; a chosen design feature to accomplish mission objectives. The Electronics bay is protected at both ends by bulkheads to keep it protected from thermal and shock effects of ejection charges from stage separation. The rockets airframe structure will be vulcanized cellulose fiber tubing wrapped with an external layer of carbon fiber. We will be using carbon fiber (blue tubing) extensively throughout the rocket as a structural coating due to its lightweight properties and durability.

To reinforce the rocket with carbon fiber, we will wrap a 3K carbon fiber sheet around the airframe and secure the fabric with epoxy. We will slide a shrink wrap sleeve onto the airframe and then use a heat gun to compress the plastic. The airframe will then cure at room temperature for 24 hours. After the 24 hour period, the above steps will be repeated to add another layer of carbon fiber to cover any holes and fix any imperfections. The airframe will then be sanded and re-epoxied to create a smooth texture. The three sections will be connected using carbon fiber reinforced couplers, although, unlike the airframe, the couplers will only be reinforced by one layer of carbon fiber rather than two. To reinforce the nose cone, it will be scuffed before starting the process of layering the carbon fiber. After this is completed, the nose cone will be covered using the same process as described above, but with one only layer of sheeting. The fins will have to be reinforced using another method: plastic sheeting will need to be laid out on a table, followed by a sheet of carbon fiber large enough to completely cover the fin, then the fabric needs to be completely covered in epoxy. The fins will be laid out onto the fabric, folded over, and vacuum sealed. Once it cures, the fins will be cut to size and sanded.

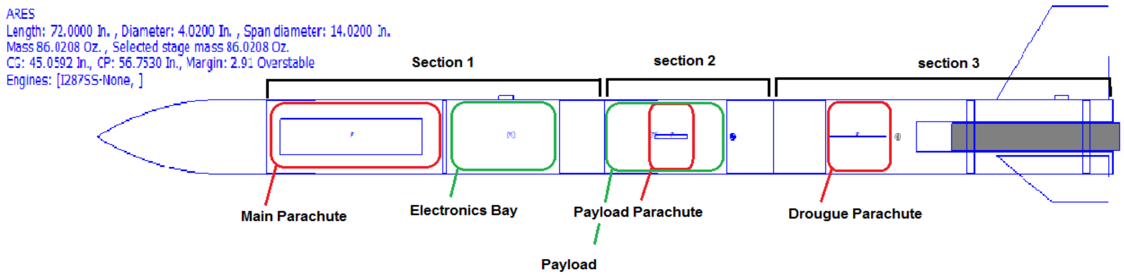

Figure 1. RockSim Schematic of Design

b. The projected altitude for the rocket is 2992.54 ft with no wind and was calculated using RockSim with the dimensions, mass distribution and geometry showcased in the above figure.
c. The drogue and payload parachutes are the Public Missiles PAR-24R nylon chutes. The main parachute is the Public Missiles PAR-72R nylon chute.
d. The projected impulse necessary for achieving the projected altitudes is approximately 486 Ns and an average thrust of 286.18 N. The selected motor is a Cessaroni I287ss with dimensions of 38.00 x 303.00 mm and loaded weight of 605.00 g. The calculations for motor selection was aided with calculations from RockSim.
e. Cessaroni I287ss thrust curve

I287-15A

Print This Page

Motor Data

Brandname	Pro38 I287 Smoky Sam	**Manufacturer**	Cesaroni Technology
Man. Designation	486 I287SS-15A	**CAR Designation**	I287-15A
Test Date	2002-05-09	**Certified Until**	2005-06-30
Single-Use/Reload/Hybrid	Reloadable	**Motor Dimensions mm**	38.00 x 303.00 mm (1.50 x 11.93 in)
Loaded Weight	605.00 g (21.18 oz)	**Total Impulse**	486.00 Ns (109.35 lb.s)
Propellant Weight	330.80 g (11.58 oz)	**Maximum Thrust**	344.20 N (77.44 lb)
Burnout Weight	242.00 g (8.47 oz)	**Avg Thrust**	286.18 N (64.39 lb)
Delays Tested	15,12,10,8,6 secs	**ISP**	s
Samples per second	1000	**Burntime**	1.70 s
Notes	This is the Smoky Sam propellant - dark thick smoke.		

Representative CMT Thrust Curve

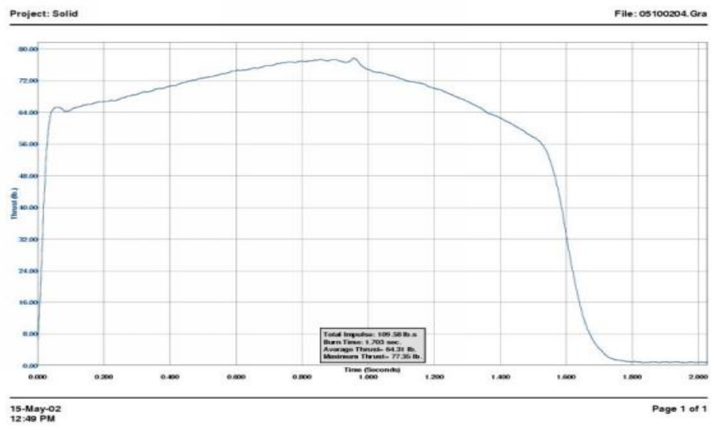

Figure 2: Thrust Curve of Selected Motor

f.

1. **Vehicle Requirements**
   1.1. Our vehicle shall deliver the payload to, but not exceeding, an apogee altitude of 3,000 feet above ground level
   1.2. The official scoring altimeter shall report the official competition altitude via a series of beeps to be checked after the competition flight.
   1.3. Our launch vehicle will be reusable after launch
   1.4. There will be no more than 4 sections on our launch vehicle
   1.5. The launch vehicle is a single stage
   1.6. The launch vehicle shall be capable of being prepared for flight at the launch site within 2 hours, from the time the Federal Aviation Administration flight waiver opens.
   1.7. The launch vehicle shall be capable of remaining in launch ready configuration at the pad for a minimum of one hour without losing the functionality of any critical on-board component
   1.8. The launch vehicle will be capable of being launched by a standard 12 volt direct current firing system.
   1.9. The launch vehicle will use a commercially available solid motor
   1.10. The total impulse will not exceed 5,120 Newtons
   1.11. N/A

1.12. Pressure vessels on the vehicle will be approved by the RSO and will meet the criteria

1.13. We will launch a subscale model prior to CDR.

1.14. We will launch and recover our full scale flight vehicle prior to FRR.

1.15. Our budget will not exceed $5000

1.16. Vehicle Prohibitions

1.16.1. The launch vehicle has no forward canards

1.16.2. The rocket does not utilize forward facing motors

1.16.3. The launch vehicle will not use motors that expel titanium sponges

1.16.4. The launch vehicle will not use hybrid motors

1.16.5. The launch vehicle will not utilize a cluster of motors

2. Recovery System Requirements

2.1. The drogue parachute will be deployed at apogee and a main parachute is deployed at a much lower altitude. Tumble recovery or streamer recovery from apogee to main parachute deployment is also permissible, provided that the kinetic energy during drogue-stage descent is reasonable, as deemed by the Range Safety Officer.

2.2. The team will perform a successful ground ejection test for the drogue and main parachutes prior to the initial subscale and full scale launches.

2.3. At landing, each independent section of the launch vehicle shall have a maximum kinetic energy of 75 ft-lbf.

2.4. The recovery system electrical circuits and payload electrical circuits will be completely independent from one another.

2.5. The recovery system will contain commercially available, redundant altimeters. “Altimeters” includes both simple altimeters and more sophisticated flight computers.

2.6. Each altimeter shall be armed by a dedicated arming switch that is accessible from the exterior of the rocket airframe when it is in the launch configuration on the launch pad.

2.7. Each altimeter will have a reliable power supply.

2.8. Each arming switch will be capable of being locked in the ON position for launch.

2.9. Removable shear pins will be used for both the main parachute and drogue parachute compartments.

2.10. An electronic tracking device will be installed in the launch vehicle and will transmit the position of the tethered vehicle and any of the independent sections to a ground receiver.

2.10.1. The payload component, which lands untethered to the launch vehicle, will carry an active electronic tracking device

2.10.2. The electronic tracking device will be fully functional during the official flight at the competition launch site.

2.11. The recovery system electronics will not be affected by any other electronic devices on-board during the flight.

2.11.1. The recovery system altimeters shall be physically located in a separate compartment within the vehicle as to not be disturbed by any radio frequency transmitting device/magnetic wave producing device.

2.11.2. The recovery system electronics will be shielded from all onboard transmitting devices.

2.11.3. The recovery system electronics shall be shielded from all onboard devices which may generate magnetic waves.

2.11.4. The recovery system electronics will be shielded from any other onboard devices which may affect the proper operation of the recovery system electronics.

3. Competition & Autonomous Ground Support Equipment (AGSE) Requirements

3.1. Mini-MAV

3.1.1. The mini-MAV will capture and contain a payload, launch, and eject it upon the launch vehicles decent

3.1.2. The AGSE will comply with these rules

3.1.3. The AGSE will not use any of the prohibited technology

3.1.4. The payload will comply with these requirements

3.1.5. Safety and ASGE control

3.1.5.1. There will be a master switch to power the AGSE and will be easily accessible

3.1.5.2. There will be a pause switch easily accessible

3.1.5.3. There will be a safety light that indicates that the AGSE is turned on. The light will be amber colored.

g. The first major technical challenge to address would be the design of the autonomous ground support vehicle and specifically the multi degree of freedom arm being used to grab and properly allocate the payload container. Using a laser guided feedback controller and sensor, the AGSE will be able to detect where the payload container is located and pick it up via a clamping mechanism, with key challenges being the dexterity, sensing capabilities, and reach. Designing the motor mechanism for the door to the payload housing presents another technical challenge. The motor needs to open and close autonomously without interfering with the other mechanical components in the rocket as well as being able to sense when to close based on the presence of the payload. The electronic hardware that dictates when the door opens and closes will need to be designed at a safe distance away from the ejection charges used during the jettisoning of the payload canister at 1,000 ft. during the descent. A certain level of programming and feedback control will be necessary in order to program altitude sensors to detect the proper times and heights to blast the ejection caps in the correct order in order to properly jettison the payload canister. A redundant altimeter will be utilized in conjunction with the rocket feedback control system to analyze the vehicle's position in real time and be able to accurately eject the payload at 1000 ft. during descent. The previously stated technical challenges provide an opportunity to employ a great deal of creativity and ingenuity to exhibit the proposed solutions given ample calculations, testing and analysis.

Educational Engagement

Project Ares plans to work with middle schools and high schools in the Orlando area throughout the duration of the Student Launch project. The team plans to host numerous events related to rocketry, including teaching the physics behind rockets and launching water bottle rockets. The overall goal of working with the students will be to encourage them to pursue careers in STEM and promote enthusiasm in STEM-related fields. The team also plans to work with other student organizations at the University of Central Florida to conduct outreach events. The events will be considered successful if interactions with students are positive and students comprehend basic rocketry.

Project Plan

1. Project Timeline

10/6/2014	Proposal due
10/17/2014	Accepted proposals announced
10/31/2014	Deadline to establish web presence
11/5/2014	Preliminary Design Review report due
11/7/2014 - 11/21/2014	Preliminary Design Review video teleconference
1/16/2015	Critical Design Review report due

1/21/2015 - 2/4/2015	Critical Design Review video teleconference
3/16/2015	Flight Readiness Review report due
3/18/2015 - 3/27/2015	Flight Readiness Review video teleconference
4/7/2015	Travel to Huntsville, Alabama
4/7/2015 - 4/8/2015	Launch Readiness Review
4/8/2015	Safety Briefing
4/9/2015	Rocket Fair
4/10/2015	Mini/Max MAV Launch Day
4/12/2015	Backup Launch Day
4/29/2015	Post-Launch Assessment Review due to team website
5/11/2015	Winning team announced

2. Project Budget

Cessaroni I287ss	$46.00
38mm Motor Casing	$35.65
Airframe	$400
Carbon Fiber	$100
Electronics	$400
Recovery System	$200
Travel x 16	$400
Lodging x 16	$2880
Total	**$4461.65**

3. Funding Plan

Project Ares will have several funding sources. Partial funding, in a maximum allowable amount of up to $1000, will be requested from the Student Government Association (SGA) at the University of Central Florida. The remainder of the funding will be made up from sponsorships, private donations, and fundraiser proceeds. A possible sponsor is the Florida Space Grant Consortium. Private donations will be facilitated through a donation page on the SEDS-UCF Student Launch website as well as in person through the SEDS-UCF chapter. Possible fundraisers include partial proceed nights at local Orlando restaurants, bake sales, running concession stands at area sporting events for partial profits, and participating in paid research studies. Travel expenses for the competition launch will be partially funded by group members. Partial travel funding will also be requested from the UCF SGA.

4. Community Support

Additional support will be needed from several areas in the community. Sponsorships will be necessary to fund the construction of the subscale and full-scale rockets. The team will be contacting rocket parts companies that SEDS-UCF has worked with in the past for advice on the best parts for the project and the possibility of reduced costs on parts. Advice on the design and building process will be sought from several mentors in the area. The aerospace engineering faculty at UCF will be a valuable resource. Several of the lab directors will be necessary for assistance with the robotics system and manufacturing process. SEDS-UCF alumni might also be a reference for the construction process.

5. Project Sustainability

Project Ares is run through the Students for the Exploration and Development of Space chapter at the University of Central Florida. SEDS-UCF has participated in NASA USLI/Student Launch for several years. The Student Launch project has become a regular project offered by SEDS-UCF for participation by current members. Interest in this year’s project stemmed from last year’s project. The members of last year’s team shared their experiences of the project as well as the media from the project, prompting participation and excitement for this year. This year's team is planning to do the same, in terms of encouraging future participation in the Student Launch project. Competing in such a high-level project inspires younger members and members that have not been involved before to participate in rocket projects, even if not at this high of a level. SEDS-UCF offers several other rocket experiences such as the Introduction to Rocketry Workshop, Florida Space Grant Consortium 2K and maximum altitude mini-hybrid rocket competition, and the SEDS National 10K rocketry competition. The Student Launch project is the highest level project SEDS-UCF offers, so it offers a goal for members to strive for in rocketry experience.

The project also will have impact outside of UCF. The contacts made through the educational outreach will continue for following years. Sponsors and supporters will be kept current on the rocket progress and final results. The companies that supply the parts will also receive updates on the project, especially as these companies are used for multiple SEDS-UCF projects each year.

Appendix

UCF Rocket Team Safety Agreement
By signing this document I _______________________________ agree to abide by the following rules and safety guidelines.

I agree to read and adhere by the following rules and safety procedures instituted by: National Rocketry Association/Tripoli Rocketry Association High Power Rocket Safety Code, Federal Aviation Regulations 14 CFR, Subchapter F, Part 101, Subpart C, Amateur Rockets, Code of Federal Regulation 27 Part 55: Commerce in Explosive; and fire prevention, and NFPA 1127 “Code for High Power Rocket Motors.”

I also agree to abide by the safety regulations provided by University of Central Florida Environmental Health and Safety Department. When dealing with possible hazardous material, I will abide by UCF Personal Protection Equipment guidelines. As well as listen to the Faculty members, Team Leaders, and Safety Officer. If unsure about any topic concerning UCF rocket team I will seek out guidance from the Team Lead or Safety Officer. I will stay aware of my surrounding and notify my Safety Officer of any potentially harmful situations. By signing I also agree to adhere by Huntsville Area Rocketry Association ruling (HARA).
Print Name: ____________________________
Signature: ____________________________
Date: ______________________________

UCF Rocket Team Safety Agreement

By signing this document I Daniel Garcia agree to abide by the following rules and safety guidelines.

I agree to read and adhere by the following rules and safety procedures instituted by: National Rocketry Association/Tripoli Rocketry Association High Power Rocket Safety Code, Federal Aviation Regulations 14 CFR, Subchapter F, Part 101, Subpart C, Amateur Rockets, Code of Federal Regulation 27 Part 55: Commerce in Explosive; and fire prevention, and NFPA 1127 "Code for High Power Rocket Motors."

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Print Name: Daniel Garcia

Signature: [signature]

Date: 10/4/2014

UCF Rocket Team Safety Agreement

By signing this document I ___Greg Harmeling___ agree to abide by the following rules and safety guidelines.

I agree to read and adhere by the following rules and safety procedures instituted by: National Rocketry Association/Tripoli Rocketry Association High Power Rocket Safety Code, Federal Aviation Regulations 14 CFR, Subchapter F, Part 101, Subpart C, Amateur Rockets, Code of Federal Regulation 27 Part 55: Commerce in Explosive; and fire prevention, and NFPA 1127 "Code for High Power Rocket Motors."

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Print Name: ___Greg Harmeling___

Signature: ___[signature]___

Date: ___10-5-14___

UCF Rocket Team Safety Agreement

By signing this document I __Chris Alrrard__ agree to abide by the following rules and safety guidelines.

I agree to read and adhere by the following rules and safety procedures instituted by: National Rocketry Association/Tripoli Rocketry Association High Power Rocket Safety Code, Federal Aviation Regulations 14 CFR, Subchapter F, Part 101, Subpart C, Amateur Rockets, Code of Federal Regulation 27 Part 55: Commerce in Explosive; and fire prevention, and NFPA 1127 "Code for High Power Rocket Motors."

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Print Name: __Chris Alrrard__

Signature: __[signature]__

Date: __10/1/2014__

UCF Rocket Team Safety Agreement

By signing this document I Tristan Reynoso agree to abide by the following rules and safety guidelines.

I agree to read and adhere by the following rules and safety procedures instituted by: National Rocketry Association/Tripoli Rocketry Association High Power Rocket Safety Code, Federal Aviation Regulations 14 CFR, Subchapter F, Part 101, Subpart C, Amateur Rockets, Code of Federal Regulation 27 Part 55: Commerce in Explosive; and fire prevention, and NFPA 1127 "Code for High Power Rocket Motors."

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Print Name: Tristan Reynoso

Signature: [signature]

Date: 10-24-2014

UCF Rocket Team Safety Agreement

By signing this document I Angelique Solano agree to abide by the following rules and safety guidelines.

I agree to read and adhere by the following rules and safety procedures instituted by: National Rocketry Association/Tripoli Rocketry Association High Power Rocket Safety Code, Federal Aviation Regulations 14 CFR, Subchapter F, Part 101, Subpart C, Amateur Rockets, Code of Federal Regulation 27 Part 55: Commerce in Explosive; and fire prevention, and NFPA 1127 "Code for High Power Rocket Motors."

I also agree to abide by the safety regulations provided by University of Central Florida Environmental Health and Safety Department. When dealing with possible hazardous material, I will abide by UCF Personal Protection Equipment guidelines. As well as listen to the Faculty members, Team Leaders, and Safety Officer. If unsure about any topic concerning UCF rocket team I will seek out guidance from the Team Lead or Safety Officer. I will stay awars of my surrounding and notify my Safety Officer of any potentially harmful situations. By signing I also agree to adhere by Huntsville Area Rocketry Association ruling (HARA).

Print Name: Angelique Solano

Signature: Angelique Solano

Date: 10/4/2014

UCF Rocket Team Safety Agreement

By signing this document I [illegible] agree to abide by the following rules and safety guidelines.

I agree to read and adhere by the following rules and safety procedures instituted by: National Rocketry Association/Tripoli Rocketry Association High Power Rocket Safety Code. Federal Aviation Regulations 14 CFR, Subchapter F, Part 101, Subpart C, Amateur Rockets, Code of Federal Regulation 27 Part 55: Commerce in Explosive; and fire prevention, and NFPA 1127 "Code for High Power Rocket Motors."

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Print Name: [illegible]

Signature: [illegible]

Date: 10/09/14

UCF Rocket Team Safety Agreement

By signing this document I _Kristin Braswell__________ agree to abide by the following rules and safety guidelines.

I agree to read and adhere by the following rules and safety procedures instituted by: National Rocketry Association/Tripoli Rocketry Association High Power Rocket Safety Code, Federal Aviation Regulations 14 CFR, Subchapter F, Part 101, Subpart C, Amateur Rockets, Code of Federal Regulation 27 Part 55: Commerce in Explosive; and fire prevention, and NFPA 1127 "Code for High Power Rocket Motors."

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Print Name: Kristin Braswell

Signature: Kristin Braswell

Date: 10/4/2014

UCF Rocket Team Safety Agreement

By signing this document I ___Emily Judd___ agree to abide by the following rules and safety guidelines.

I agree to read and adhere by the following rules and safety procedures instituted by: National Rocketry Association/Tripoli Rocketry Association High Power Rocket Safety Code, Federal Aviation Regulations 14 CFR, Subchapter F, Part 101, Subpart C, Amateur Rockets, Code of Federal Regulation 27 Part 55: Commerce in Explosive; and fire prevention, and NFPA 1127 "Code for High Power Rocket Motors."

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Print Name: ___Emily Judd___

Signature: ___Emily Judd___

Date: ___10/4/14___

UCF Rocket Team Safety Agreement

By signing this document I ______John Christian______ agree to abide by the following rules and safety guidelines.

I agree to read and adhere by the following rules and safety procedures instituted by: National Rocketry Association/Tripoli Rocketry Association High Power Rocket Safety Code, Federal Aviation Regulations 14 CFR, Subchapter F, Part 101, Subpart C, Amateur Rockets, Code of Federal Regulation 27 Part 55: Commerce in Explosive; and fire prevention, and NFPA 1127 "Code for High Power Rocket Motors."

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Print Name: John Christian

Signature: ______________

Date: 10//2014

UCF Rocket Team Safety Agreement

By signing this document I Erik Kanstowitz agree to abide by the following rules and safety guidelines.

I agree to read and adhere by the following rules and safety procedures instituted by National Rocketry Association/Tripoli Rocketry Association High Power Rocket Safety Code, Federal Aviation Regulations 14 CFR, Subchapter F, Part 101, Subpart C, Amateur Rockets, Code of Federal Regulation 27 Part 55: Commerce in Explosives; and fire prevention, and NFPA 1127 "Code for High Power Rocket Motors."

I also agree to abide by the safety regulations provided by University of Central Florida Environmental Health and Safety Department. When dealing with possible hazardous material I will abide by UCF Personal Protection Equipment guidelines. As well as listen to the Faculty members, Team Leaders, and Safety Officer. If unsure about any topic concerning UCF rocket team I will seek out guidance from the Team Lead or Safety Officer. I will stay aware of my surrounding and notify my Safety Officer of any potentially harmful situations. By signing I also agree to adhere by Huntsville Area Rocketry Association ruling (HARA).

Print Name: ERIK KANSTOWITZ

Signature: [signature]

Date: 10/5/14

UCF Rocket Team Safety Agreement

By signing this document I Randy Lorenzo agree to abide by the following rules and safety guidelines.

I agree to read and adhere by the following rules and safety procedures instituted by: National Rocketry Association/Tripoli Rocketry Association High Power Rocket Safety Code, Federal Aviation Regulations 14 CFR, Subchapter F, Part 101, Subpart C, Amateur Rockets, Code of Federal Regulation 27 Part 55: Commerce in Explosive; and fire prevention, and NFPA 1127 "Code for High Power Rocket Motors."

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Print Name: Randy Lorenzo

Signature: [signature]

Date: 10/4/2014

UCF Rocket Team Safety Agreement
By signing this document I __Jeremy Young__ agree to abide by the following rules and safety guidelines.

I agree to read and adhere by the following rules and safety procedures instituted by: National Rocketry Association/Tripoli Rocketry Association High Power Rocket Safety Code, Federal Aviation Regulations 14 CFR, Subchapter F, Part 101, Subpart C, Amateur Rockets, Code of Federal Regulation 27 Part 55: Commerce in Explosive; and fire prevention, and NFPA 1127 "Code for High Power Rocket Motors."

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Print Name: __Jeremy Young__
Signature: __[signature]__
Date: __10/6/14__

UCF Rocket Team Safety Agreement

By signing this document I ___Greg Harmeling___ agree to abide by the following rules and safety guidelines.

I agree to read and adhere by the following rules and safety procedures instituted by: National Rocketry Association/Tripoli Rocketry Association High Power Rocket Safety Code, Federal Aviation Regulations 14 CFR. Subchapter F, Part 101, Subpart C, Amateur Rockets, Code of Federal Regulation 27 Part 55: Commerce in Explosive; and fire prevention, and NFPA 1127 "Code for High Power Rocket Motors."

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Print Name: ___Greg Harmeling___

Signature: ___Greg Harmeling___

Date: ___10-5-14___

UCF Rocket Team Safety Agreement

By signing this document I Chris Blizzard agree to abide by the following rules and safety guidelines.

I agree to read and adhere by the following rules and safety procedures instituted by: National Rocketry Association/Tripoli Rocketry Association High Power Rocket Safety Code, Federal Aviation Regulations 14 CFR, Subchapter F, Part 101, Subpart C, Amateur Rockets, Code of Federal Regulation 27 Part 55: Commerce in Explosive; and fire prevention, and NFPA 1127 "Code for High Power Rocket Motors."

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Print Name: Chris Blizzard

Signature: [signature]

Date: 10/4/2014

UCF Rocket Team Safety Agreement

By signing this document I Tristan Reynoso agree to abide by the following rules and safety guidelines.

I agree to read and adhere by the following rules and safety procedures instituted by: National Rocketry Association/Tripoli Rocketry Association High Power Rocket Safety Code, Federal Aviation Regulations 14 CFR, Subchapter F, Part 101, Subpart C, Amateur Rockets, Code of Federal Regulation 27 Part 55: Commerce in Explosive and fire prevention, and NFPA 1127 "Code for High Power Rocket Motors."

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Print Name: Tristan Reynoso

Signature: Tristan Reynoso

Date: 10-21-2014

UCF Rocket Team Safety Agreement

By signing this document I Joseangel Rosas agree to abide by the following rules and safety guidelines.

I agree to read and adhere by the following rules and safety procedures instituted by: National Rocketry Association/Tripoli Rocketry Association High Power Rocket Safety Code, Federal Aviation Regulations 14 CFR, Subchapter F, Part 101, Subpart C, Amateur Rockets, Code of Federal Regulation 27 Part 55: Commerce in Explosive; and fire prevention, and NFPA 1127 "Code for High Power Rocket Motors."

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Print Name: Joseangel Rosas

Signature: ____________

Date: 10-6-14