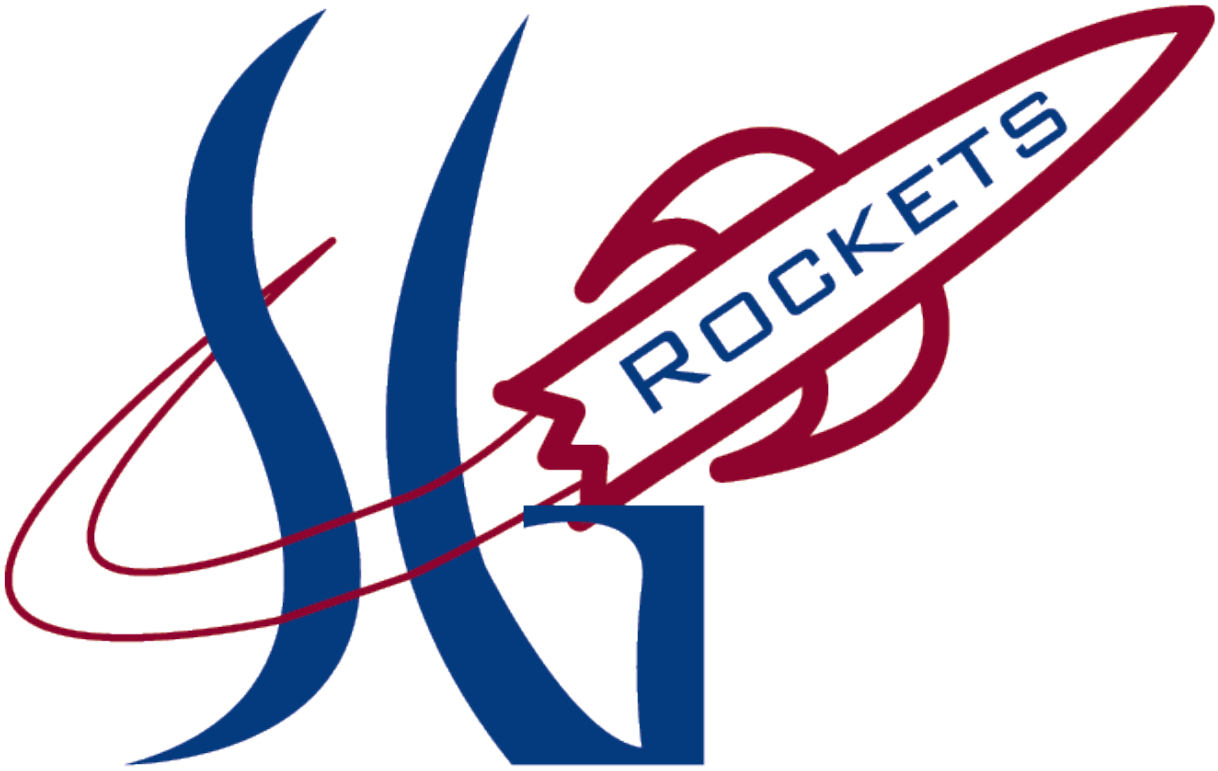
Spring Grove Area High School

SLI Rocketry Team Edited Proposal



Project One Giant Leap

The Rocket Men

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General Information

1. School Information

Name: Spring Grove Area High School

Mailing Address:
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1490 Roth's Church Road
Spring Grove, PA 17362

Name of Team:
The Rocket Men (TRM)

2. Adult Educators:
Rosemary Cugliari
Spring Grove Area High School Principal
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Brian Hastings
Physics teacher, Rocket Scientist Club Coach
Phone number: (717) 225-4731 ext. 7220
Email: Hastingsb@sgasd.org
Education: Honors B.A. in secondary education physics, a masters in science education and 60 graduate credits past my masters degree- Teacher Education Institute

Renee Eaton
Biology teacher, Rocket Scientist Club Coach
Phone number: (717) 225-4731 ext. 7242
Email: EatonR@sgasd.org
University 2008, MA in Classroom Technology- Wilkes University 2012

3. Safety Officer:
Tom Aument
NAR Representative Phone number (cell): (717) 725-4632
Email: blocker1956@comcast.net

4. We are not part of a USLI team, we are a SLI team.

5. Key Managers:
Brian Hastings- Advisor and Supervisor of students
Renee Eaton- Advisor and Supervisor of students
Mr. Sengia- Instructional Technology Specialist

Team Members

Our Team Members were asked, “What does SLI mean to you?” Here are their responses:

Jordan

Age: 17
Grade: 12

For me, SLI is a chance to prove what I can do. Not only have I had the opportunity to design and build model rockets through TARC, but now I have the chance to design and build a high-power rocket as well. Not many people can say that they’ve had the opportunity to do that, especially not while working with NASA. Without SLI, I would not be as confident as I am now about my major in aerospace.

Laura

Age: 17
Grade: 12

I have lead a lot of teams in my life, but there is nothing quite like SLI. We have huge reports that take many hours to finish, but it is very rewarding when we finish them. SLI is solidifying my desire to be an engineer. The deeper we get into this project, the more sure I am of my career path. This experience has given me insight into my life and has given me an experience that I will remember for the rest of my life.

Melissa

Age: 17
Grade: 12

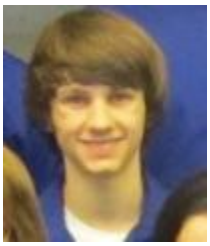
SLI is truly a once in a lifetime opportunity. SLI presents a challenge few high school students are given a change to undertake and I feel honored to be able to participate in this program. Participating in this program, will help our team improve teamwork skills, problem solving skills, and help us grow intellectually as students. I look forward to the coming months as we continue to make progress and work toward a common goal.

Mike

Age: 17
Grade: 12

SLI is the greatest opportunity I've ever been presented with. To me it means everything. I will do everything I can to ensure this project succeeds. I feel honored to partake in this project.

Chad



Age: 15
Grade: 11

SLI is a long arduous project. It is very fun to work as a team toward a common goal. It is exciting to think we will launch a rocket one mile up. To me it is an amazing opportunity to learn more about rocketry. It also teaches us to work as a team so we can get the work done on time.

Matt

Age: 16
Grade: 11

SLI is an interesting project. It's a great opportunity to build our resumes. It gets us good recognition from colleges and gives our school recognition. It can even help to get funding in the future for our science programs.

Veer

Age: 16
Grade: 11

To me, SLI is a project that will allow me to better my future by gaining experience in many different essential skills. Through SLI, I will improve my writing skills by completing sections assigned to me. I will also gain communication skills by working with fellow team members. This will better my future by allowing me to complete applications and essays for college with more strength. SLI will also allow our school to stand out among other schools, allowing the students here to go to better colleges. SLI is an amazing opportunity not only for those in the team, but also for the students in our school. I'm very grateful for this program.

Albert

Age: 15
Grade: 10

SLI is an excellent opportunity for me for several reasons. First of all, I wish to develop teamwork, and the experience will help me in that respect. As my plan is to become an aerospace engineer, the engineering experience will also benefit me. The contacts will help in the future as well as participating increasing my chances of a type 1 AFROTC scholarship, and acceptance to college of my choice. By participating in this program, I can achieve several advantages for my future career.

Kyle

Age: 15
Grade: 10

The Student Launch Initiative means a lot to me. It is a great opportunity for me to learn about the engineering field and what I could possibly do after high school and college. It also is a great thing that I could put on my college resume, and for the chance to get into a great college, and also have the great opportunity to work with NASA engineers. I will make sure I spend my time working, and give it all so that this team can succeed. I feel honored to be part of the SLI program, and have the chance to improve my reading, writing, and speech skills.

Wyatt

Age: 15
Grade: 10

SLI, to me, is a once in a lifetime opportunity to meet with NASA engineers. It will improve my chances of getting into a college I want, and the field of study I want. SLI will be a fun method of learning about rockets, and learning about my potential field of study. Also, I will learn what it is like to manage parts of a project and to have a timeline were I need to have parts of the project done a specific time. This will help me to be more able to complete projects like these in the future.

David

Age: 15
Grade: 9

SLI is an excellent and great opportunity for me, I feel honored to be part of the program and besides it's not every day that you get to say that you're working with NASA. it is truly a once in a lifetime opportunity to learn about the engineering field I would like to enter after high school. I will be able to contribute to projects like these in the future with a much better understanding of what I'm doing because this is after all only our schools first year of working on such a project it will also help me get into the college I hope to go to in the near future, thus launching me on my career path.

6. Our NAR Representative and Advisor is Tom Aument.

Facilities and Equipment

Wood Lab Safety

Framar Band Saw

Before operating the band saw, remove all jewelry, confine long hair, and remove or roll up long sleeves or any article of clothing that could become caught in the blade or the band saw. Also, obtain an instructor's permission to use the machine and ensure that safety glasses are covering your eyes. When cutting, make sure adjustment knobs are tight; the upper blade guard should be around one eighth of an inch above the material being cut. Do not force any material through the blade, attempt to cut a radius smaller than the blade will allow, and do not back out of long cuts. Keep fingers on either side of the cut line, never on the line. If necessary, use a push stick or scrap block to guide the material through. Do not allow bystanders to stand to the right of the machine, because if the blade breaks, an injury may occur. Never leave the machine until the blade has come to a complete stop. If an injury should occur during the usage of the band saw, stop the machine, step on the break to stop the blade quickly, inform an instructor of the injury, and then have the rest of the students in the classroom sit outside in the hallway to avoid being in the way of instructors and medical personnel helping the student.

Router

Before operating the router, remove all jewelry, confine long hair, and remove or roll up long sleeves or any article of clothing that could become caught in the router or router bit. Also, obtain an instructor's permission to use the machine and ensure that safety glasses are covering your eyes. Ensure that the power switch is in the off position before plugging in the router. Then, check to make sure that the bit is firmly secured in the chuck and that the piece being worked on is firmly secured. Also make sure that the intended path of the router is free of obstructions. Hold the router with both hands and apply constant pressure. Never force the router or bit into the work. When changing bits or making adjustments turn off the router and unplug it from its power source. If an injury should occur during usage of the router, turn off the machine, inform an instructor of the injury, and then have the rest of the students in the classroom sit outside in the hallway to avoid being in the way of instructors and medical personnel helping the student.

Delta Radial Arm Saw

Before operating the saw, remove all jewelry, confine long hair, and remove or roll up long sleeves or any article of clothing that could become caught in the blade. Also, obtain an instructor's permission to use the radial arm saw and ensure that your eyes are covered by safety glasses. Make all needed adjustments, such as adjusting the blade guard and kickback fingers, while the power is off. Test to see if leaf guards are working properly and that the blade does not extend past the edge of the table. Always firmly hold materials against the fence and pull the blade completely through the material and return blade behind the fence before removing the material and starting another cut. If too much of the table is cut away, then the instructor must be notified so that the table can be replaced. Wait for the blade to stop before leaving the machine. If an should injury occur during usage of the saw, turn off the machine, inform an instructor of the injury, and then have the rest of the students in the classroom sit outside in the hallway to avoid being in the way of instructors and medical personnel helping the student.

Planer-Surface Sander

Before operating the sander, remove all jewelry, confine long hair, and remove or roll up long sleeves or any article of clothing that could become caught in the machine. Also, obtain an instructor's permission to use the sander and ensure that safety glasses are covering your eyes. Turn on the sawdust collection system. Check all material for loose knots, nails, staples, or any other loose, foreign objects. Never force a material through the planer; after insertion the machine will automatically feed it through. The operator should wait on the other side of the machine to receive the material. Select a proper machine depth and speed for the material being used. Never attempt to plane more than an eighth of an inch of material in one pass. Do not look into the machine at surface level or try to clean debris while the machine is turned on. Always stand to the side, because the possibility of kick back always exists. If injury occurs during usage of the sander, turn off the machine, inform an instructor of the injury, and then have the rest of the students in the classroom sit outside in the hallway to avoid being in the way of instructors and medical personnel helping the student.

Dewalt Compound Miter Saw

Before operating the saw, remove all jewelry, confine long hair, and remove or roll up long sleeves or any article of clothing that could become caught in the blade. Also, obtain an instructor's permission to use the saw and ensure that safety glasses are covering your eyes. Make all changes to the saw and saw blade while the power is off and the plug is disconnected from its power supply. Hold the material firmly against the fence and the table. Allow the motor to reach its full speed before attempting to cut through the material. Make sure that all guards are functioning properly. If injury occurs during usage of the Miter Saw, turn off the machine, inform an instructor of the injury, and then have the rest of the students in the classroom sit outside in the hallway to avoid being in the way of instructors and medical personnel helping the student.

Jointer

Before operating the jointer, remove all jewelry, confine long hair, and remove or roll up long sleeves or any article of clothing that may become caught in the blade. Also, obtain an instructor's permission to use the jointer and ensure that safety glasses are covering your eyes. Turn on the sawdust collection system. Make all changes or adjustments to the jointer while the power is off. Use a push stick or scrap block if your hands run the risk of coming within two inches of the blade. Do not attempt to take off more than one eighth of an inch at a time. The minimum length of material that can be cut with the jointer is double the size of the blades. If injury occurs during usage of the jointer, turn off the machine, inform an instructor of the injury, and then have the rest of the students in the classroom sit outside in the hallway to avoid being in the way of instructors and medical personnel helping the student.

Hand Sanders

Before operating the hand sanders, remove all jewelry, confine long hair, and remove or roll up long sleeves or any article of clothing that could become caught in the machine. Also, obtain an instructor's permission to use the hand sanders and ensure that safety glasses are covering your eyes. Replace the sand paper while the sander is off and unplugged. Only use sand paper that is in good condition and properly installed. Place the material that you intend on sanding on a flat surface and sand slowly over a large area. Wait for the sander to stop oscillating before placing it on a secure resting surface. Never carry any corded tool by the power cord. If injury occurs during usage of the hand

sanders, turn off the machine, inform an instructor of the injury, and then have the rest of the students in the classroom sit outside in the hallway to avoid being in the way of instructors and medical personnel helping the student.

Electric Drills

Before operating the drill, remove all jewelry, confine long hair, and remove or roll up long sleeves or any article of clothing that could become caught in the bit. Also, obtain instructor permission before using the drills and ensure that safety glasses are covering your eyes. Replace the bit while the power is off, installing the bit properly and making sure the chuck is tightened and the chuck key is taken out. Never drill without first marking the hole with an awl. Ensure the material is clamped securely and drill with even pressure. Never carry any corded tool by the power cord. If injury occurs during usage of the electric drills, turn off the drill, inform an instructor of the injury, and then have the rest of the students in the classroom sit outside in the hallway to avoid being in the way of instructors and medical personnel helping the student.

Powermatic Drill Press

Before operating the drill press, remove all jewelry, confine long hair, and remove or roll up long sleeves or any article of clothing that could become caught in the bit or machine. Also, obtain instructor permission and ensure that safety glasses are covering your eyes. Replace the bit while the power is off, installing the bit properly and making sure the chuck is tightened and the chuck key is taken out. Firmly secure the material that you are drilling with vices or clamps. Adjust the table to avoid drilling into it and pick the correct size bit that is properly sharpened. If the drill becomes stuck turn off the machine and inform an instructor. Select the proper speed for the material. If an injury occurs during usage of the drill press, turn off the machine, inform an instructor of the injury, and then have the rest of the students in the classroom sit outside in the hallway to avoid being in the way of instructors and medical personnel helping the student.

CNC Router

Before operating the router, remove all jewelry, confine long hair, and remove or roll up long sleeves or any article of clothing that could become caught in the bit or machine. Also, obtain an instructor’s permission to use the router and ensure that safety glasses

are covering your eyes. Turn on the sawdust collection system. Make all adjustments while machine is off. Materials must be firmly secured before the project is run through the router. A person needs to be with the machine during the entire operation. Check to make sure that the spindle rotation, speed, and depth of cut are all correct before starting the machine. Only clean the machine while it is off and make sure that all set up tools are cleared from the table. If an injury occurs during usage, turn off the machine, inform an instructor of the injury, and then have the rest of the students in the classroom sit outside in the hallway to avoid being in the way of instructors and medical personnel helping the student.

Oliver Table Saw

Before operating the table saw, remove all jewelry, confine long hair, and remove or roll up long sleeves or any article of clothing that could become caught in blade. Also, obtain an instructor's permission to use the table saw and ensure that safety glasses are covering your eyes. Turn on the sawdust collection system. Make all adjustments to the blade or guide while machine is off. Gullets of the blade must clear the top of the material. Never use the miter gauge and the fence at the same time. The miter gauge it for cross cutting and the fence is for ripping. Use extra caution while using a dado cutting head. Always use a push stick when your hand could come close to the blade and have another person at the other end of the table to catch the material that was just cut. Do not leave the table until the blade stops. If an injury occurs during usage of the table saw, turn off the machine, inform an instructor of the injury, and then have the rest of the students in the classroom sit outside in the hallway to avoid being in the way of instructors and medical personnel helping the student.

Powermatic Belt Sander

Before operating the belt sander, remove all jewelry, confine long hair, and remove or roll up long sleeves or any article of clothing that could become caught in machine. Also, obtain an instructor's permission before using the machine and ensure that safety glasses are covering your eyes. Make all adjustments while the machine is off. Check that there is adequate tension in the belt and that it is not torn before turning on the machine. Keep the material on the table at all times. Keep fingers away from the sand paper. If an injury occurs during the usage of the sander, turn off the machine, inform an instructor of the injury. The instructor will then have any students in the room go out into the hallway. This will ensure that the students do not interfere with the injured person, instructors, or medical personnel that will be helping the student.

Powermatic Disc Sander

Before operating the disc sander, remove all jewelry, confine long hair, and remove or roll up long sleeves or any article of clothing that could become caught in the machine. Also, obtain an instructor's permission before using the sander and ensure that safety glasses are covering your eyes. Make all adjustments while machine is off. Check that the disc was properly installed and that it is not torn. Keep the material on the table at all times. Keep fingers away from the sand paper. If an injury should occur during usage, turn off the machine, inform an instructor of the injury, and then have the rest of the students in the classroom sit outside in the hallway to avoid being in the way of instructors and medical personnel helping the student.

Powermatic Drum Sander

Before operating the drum sander, remove all jewelry, confine long hair, and remove or roll up long sleeves or any article of clothing that could become caught in the machine. Also, obtain an instructor's permission before using the sander and ensure that safety glasses are covering your eyes. Make all adjustments while machine is off. Use the proper drum for the radius that is being sanded. Keep the material that you are sanding on the table at all times. Keep fingers away from the sand paper. If an injury occurs during usage, turn off the machine, inform an instructor of the injury, and then have the

rest of the students in the classroom sit outside in the hallway to avoid being in the way of instructors and medical personnel helping the student.

Craftsman Reciprocating Saw

Before operating the reciprocating saw, remove all jewelry, confine long hair, and remove or roll up long sleeves or any article of clothing that could become caught in the blade. Also, obtain an instructor's permission before using the saw and ensure that safety glasses are covering your eyes. Make all changes with the power off and the plug disconnected from its power supply. Firmly secure all material to a work bench or table. Allow the motor to reach its full speed before cutting through the material. Hold the saw with both hands while you are using it. If an injury occurs during usage, turn off the machine, inform an instructor of the injury, and then have the rest of the students in the room sit outside in the hallway to avoid being in the way of instructors and medical personnel helping the student.

Craftsman Circular Saw

Before operating the circular saw, remove all jewelry, confine long hair, and remove or roll up long sleeves or any article of clothing that could become caught in the blade. Also, obtain an instructor's permission before using the saw and ensure that safety glasses are covering your eyes. Make all changes with the power off and the plug disconnected from its power supply. Firmly secure all material to a work bench or table. Before cutting, ensure that the cut line is not above the table. At least one person must be holding the material being cut off, as long as that piece is large enough for a person to hold it. Allow the motor to reach its full speed before cutting through the material. Hold the saw with both hands while using it. If an injury occurs during usage, turn off the machine, inform an instructor of the injury, and then have the rest of the students in the classroom sit outside in the hallway to avoid being in the way of instructors and medical personnel helping the student.

CNC Lathe (EMCO Concept Mill 55, Lab Volt 5400 CNC Mill, a Lab volt Automation 5500-B0)

Before operating the lathe, remove all jewelry, confine long hair, and remove or roll up long sleeves along with any article of clothing that could become caught in the bit. Also, obtain an instructor's permission before using the lathe and ensure that safety glasses are covering your eyes. Make all adjustments while machine is off. The material that you intend on cutting must be firmly secured before the project is run through the lathe. A person needs to be with the machine during the entire operation. Check to make sure that the spindle rotation, speed, and depth of cut are all correct before starting the machine. Only clean the machine while it is off .If an injury occurs during the usage of the lathe, turn off the machine, inform an instructor of the injury, and then have the rest of the students in the classroom sit outside in the hallway to avoid being in the way of instructors and medical personnel helping the student.

Victor metal lathes

Before operating the lathes, remove all jewelry, confine long hair, and remove or roll up long sleeves or any article of clothing that could become caught in the work. Also, obtain an instructor's permission before using the lathe and ensure that safety glasses are covering your eyes. Make all changes with the power off. Center the material so that it will not spin off-center. Firmly secure all of the material to a machine. Use the proper

speed for the task at hand. Use the correct, sharpened tools. If an injury occurs during usage, turn off the machine, inform an instructor of the injury, and then have the rest of the students in the classroom sit outside in the hallway to avoid being in the way of instructors and medical personnel helping the student.

Paasche FABSF-6 spray booth

Before using the spray booth, turn on the ventilation system and wear proper protection. Use the correct spray for the material and do not inhale toxic fumes. If an injury occurs during usage, inform an instructor of the injury, and then have the rest of the students in the classroom sit outside in the hallway to avoid being in the way of instructors and medical personnel helping the student.

Miller Spot Welder

Before operating the welder, put on proper clothing, welding mask, gloves, and apron. Obtain an instructor's permission before using the welder. Do not look at the welding torch unless you are wearing a welding mask. Ensure that the proper solder is being used and that the materials are secured. If an injury occurs during usage, turn off the machine, inform an instructor of the injury, and then have the rest of the students in the classroom sit outside in the hallway to avoid being in the way of instructors and medical personnel helping the student.

Baldor grinder/buffers

Before using the grinder and buffers, put on safety glasses, check that the spark shield is intact, and obtain an instructor's permission to use it. Keep hands away from the spinning wheel. Adjust the tool rest to the proper height and always use it. If an injury occurs during its usage, turn off the machine, inform an instructor of the injury, and then have the rest of the students in the classroom sit outside I the hallway to avoid being in the way of instructors and medical personnel helping the student.

Tennsmith Sheet metal cutter

Before operating the sheet metal cutter, remove all jewelry, confine long hair, and remove or roll up long sleeves or any article of clothing that could become caught in the cutter. Also, obtain an instructor's permission before using the cutter and ensure that safety glasses are covering your eyes. Do not attempt to cut any material thicker than what the machine is rated for. Make sure that the material and blade are free from debris. If an injury occurs during usage, inform instructor of the injury, and then have the rest of the students in the classroom sit outside in the hallway to avoid being in the way of instructors and medical personnel helping the student.

Gravograph LS100 30 watt laser/engraver/cutter

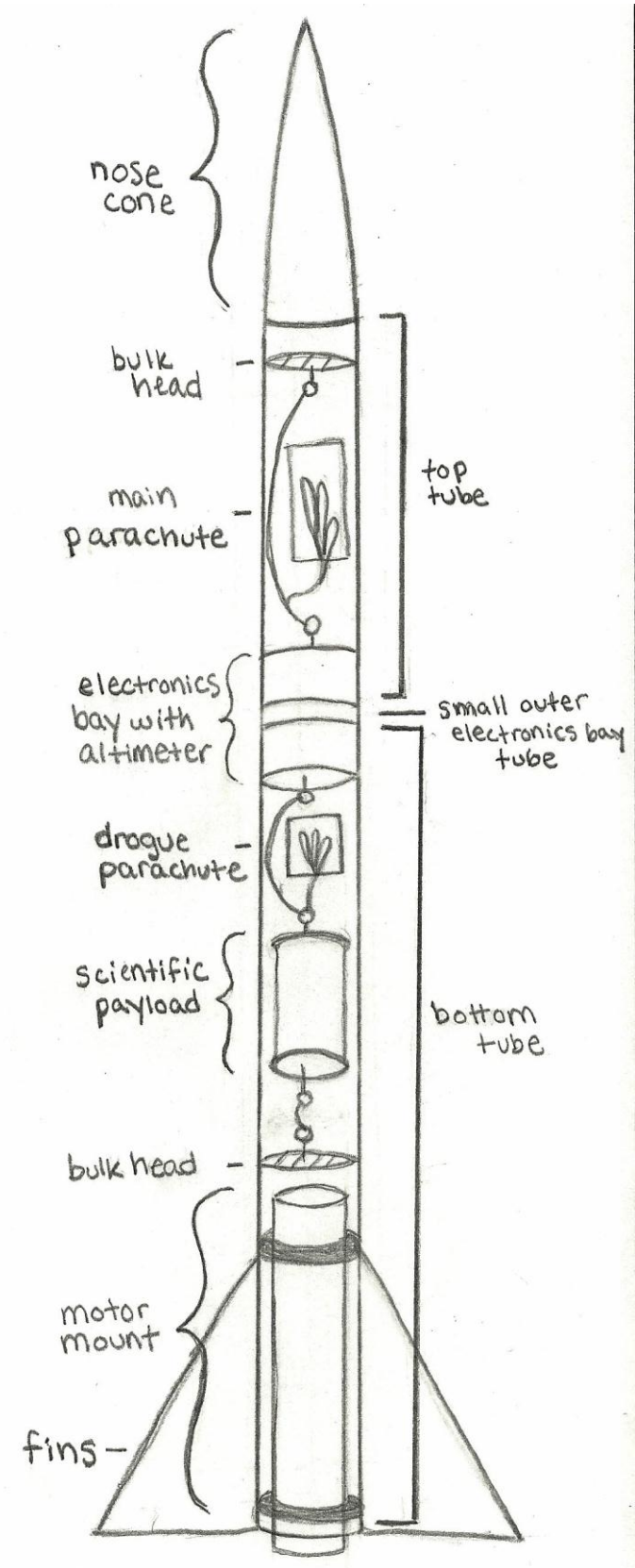
Before operating the laser, ensure that the laser is focused, the vent fan is on, and the right speed and power are selected for the material you intended on cutting or engraving. Obtain an instructor's permission before using the laser. Never look directly into the laser. Stay at the laser throughout the entire process. If the machine cuts an area that you didn't want cut or malfunctions, turn off the machine and alert an instructor immediately. If an injury occurs during usage of the laser, turn off the machine, inform an instructor of the injury, and then have the rest of the students in the classroom sit outside in the hallway to avoid being in the way of instructors and medical personnel helping the student.

Technical Design

1. Proposed rocket and Payload Design

    a. Vehicle Dimensions, Material Selection, and Construction Methods

        The rocket is planned to be 81.95 inches in length. The mass of the rocket will be 171 ounces, with the engine loaded in it. The margin of the rocket is 2.51 cal. This is calculated by the rocket design program. We are using a program called Open Rocket. The rocket contains three fins that are 120 degrees from each other. There are two PML body tubes. The top tube is 27.7 inches long and the bottom tube is 36.0 inches long. We plan on buying our Body Tubes from Public Missiles Ltd. The part number for this tube is FGPT-3.9. This tube is a typical resin impregnated spiral wrapped and heat cured tube. This tube is a very strong tube; it is stronger than cardboard. This tube is also wrapped in fiberglass. By wrapping the body tube in fiber glass, it makes the tube even stronger than a normal PML tube. The fiber glass covered tube can also withstand and resist more heat. The body tube's inner diameter is 3.9 inches. The Public Missiles Ltd. body tube was also chosen because it can withstand high velocities. This tube requires little preparation for a launch. This is appropriate for our team because we have never done SLI before. By purchasing our tubes from Public Missiles Limited, our tubing can also

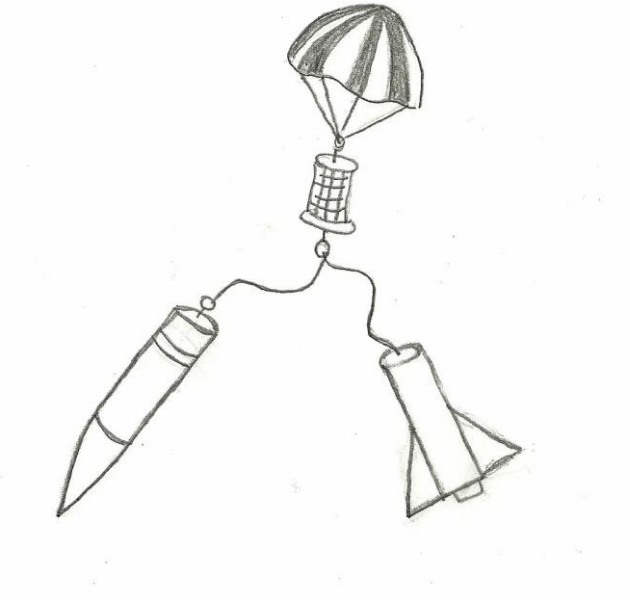


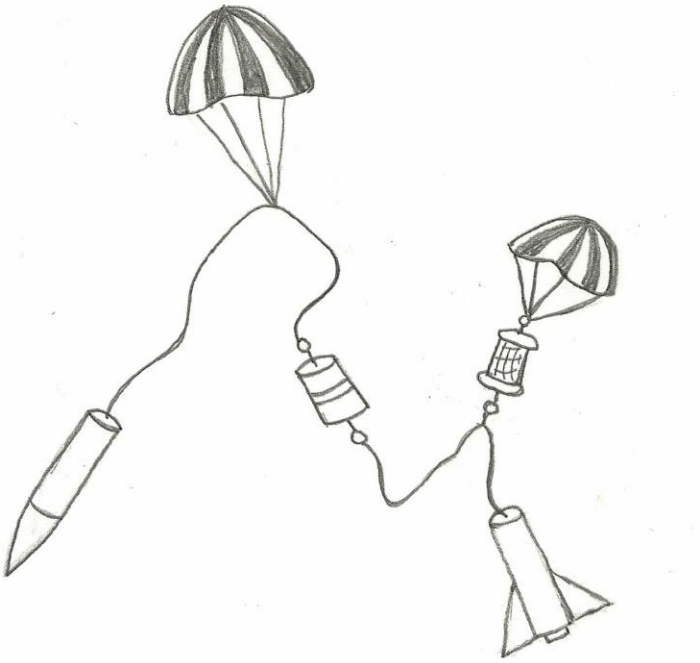
be ordered with slots for our fins. These slots, will save time during construction. This will also leave less room for error. The fiberglass reinforced body tubing will help prevent zippering when the parachute is deployed. Zippering is when the rocket is going too fast, and as a result the shock cord cuts through the body tube. The fins shall be constructed from one-eighth inch G10 FR4 fiberglass. The fiberglass is fire retardant and an electrical-grade. It is a dielectric fiberglass laminate epoxy resin sheet combined with a glass fabric substrate. The G10 FR4 sheets were selected because of their high impact, mechanical, fiberglass bond strength at high temperatures, and their resistance to the heat energy output by the K2045 Vmax motor. We shall also be using West System 105 Epoxy Resin and 205 Quick Hardener to join parts of the rocket, including the installation of the fins. West Systems Epoxy was chosen because of its superior bond strength and because of its relatively low fume output. It was also chosen because West System's 205 Hardener hardens quickly. This will make the construction process faster. As for the altimeter, we plan on using a PerfectFlite *Stratologger* altimeter. It is also affordable for this project. This altimeter can handle up to two pyrotechnic outputs, measures acceleration and also has barometric sensors. The nose cone is from Public Missiles Limited and its part number is PNC-3.9. The plastic nosecone is 16.75 inches in length.

The rocket shall be constructed only under the supervision of an adult advisor, and when needed a Range Safety Officer (ROC) or the Team Mentor. Rocket parts shall be handled accordingly to their Materials Safety Data Sheets. This will ensure that any potentially hazardous materials are used correctly and safely. Since body tube will be ordered with slots that have been pre-cut for the fins, the fins will be inserted into the slots and secured (with epoxy) at six locations. Epoxy will be applied on both sides of the fin where it attaches to the motor mount tube. It will also be applied from the inside the body tube, on both sides of the fin, where the fin exits the tube. On the outside of the body tube, epoxy will also be applied on both sides of the fin. The epoxy shall be applied generously so that air cannot pass through any joints. The epoxy will be smoothed on both sides of the fins, so that it does not interfere with the aerodynamics of the rocket. The rocket components shall either be secured or placed within the rocket so that minimal shifting occurs during the flight. The shock cords will be fastened within the rocket so that each component of the rocket is connected in series. This is in the plan to prevent the high acceleration during ejection from affecting the components of the rocket. A coupler shall be installed so that it is long enough to provide enough friction to keep the rocket body tubes together and stable during flight, but also loose enough to allow the departure of the electronics bay and bottom tube at apogee. Between the top and bottom tube there will be an electronics bay that will fasten the two tubes together until the secondary deployment.

b. Recovery System

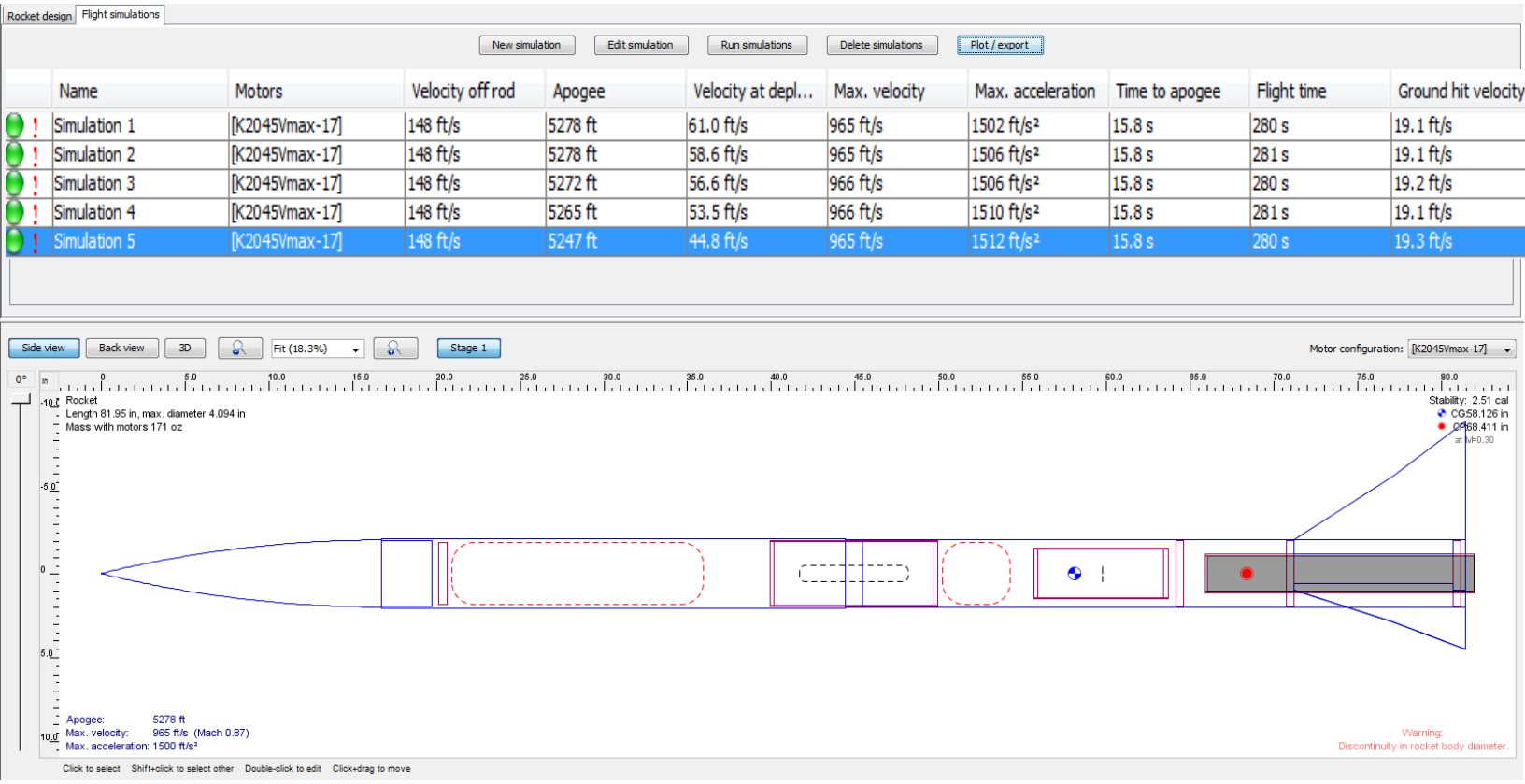
The recovery system for the launch vehicle shall employ a dual-deployment system, with a drogue chute deployed at apogee and a main chute deployed around 600feet. The drogue chute is proposed to be a 20 inch parachute that will slow the rate of acceleration from apogee to deployment of the main chute. We plan on using a 70 inch diameter main chute. This will ensure to slow the descent of the rocket to a ground hit velocity of approximately 19.1 ft/s. The deployment of the parachutes will be deployed with the help of a PerfectFlite altimeter. This altimeter measures acceleration and barometric pressure. The altimeter will be connected to an ejection charge system through two pyrotechnic outputs. There will also be an arming switch within the rocket for the pyrotechnic charges. The arming system will be accessible from the outside of the rocket airframe. The altimeter and other recovery system components run electrically, and will be able to function properly for one hour after arming the device. It won't receive interference from any other rocket component, including the payload.





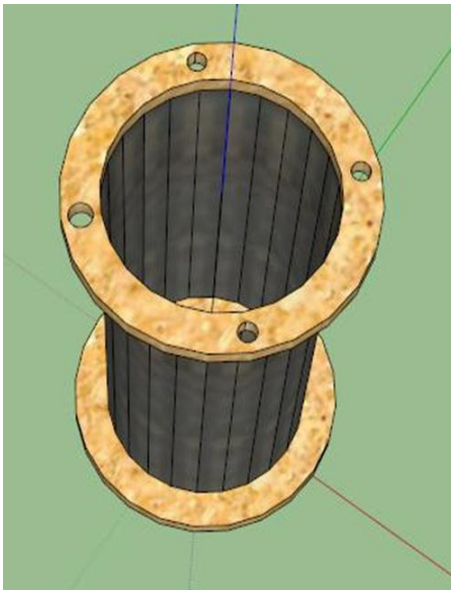
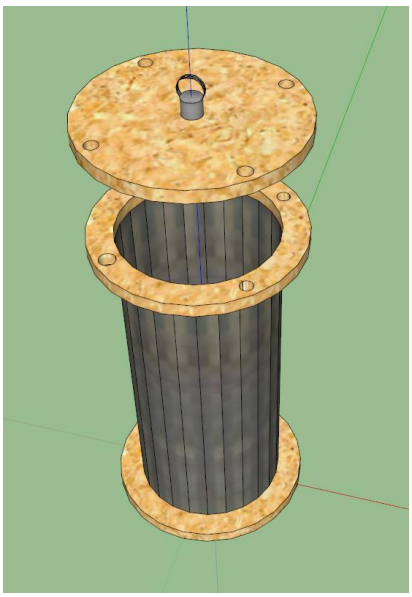
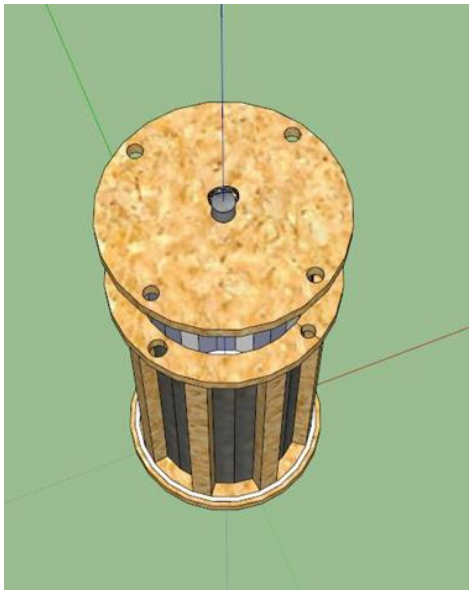
c. Motors

The proposed engine is a Cesaroni Technology Inc. K2045 Vmax motor that is 54 millimeters in diameter and 16.0 inches in length. The Cesaroni motor was selected because Cesaroni is a reliable rocket motor supply company. The K2045 Vmax motor provides the proper impulse to propel the rocket a mile high. The Cesaroni K2045 Vmax rocket motor should deliver 1417 Newton-seconds of impulse. Cesaroni motors are also affordable with our given budget.



d. Payload

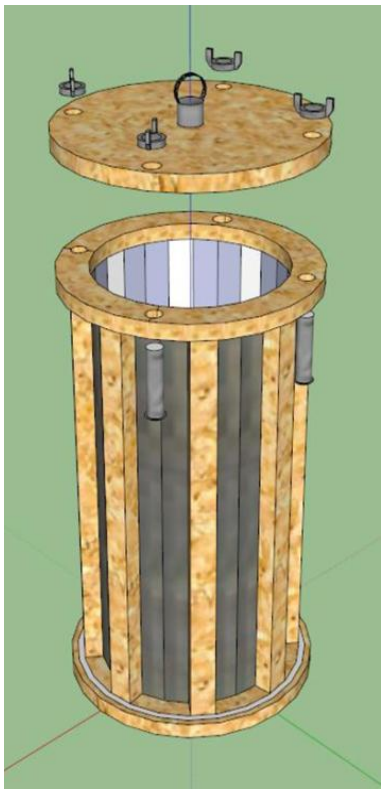
The goal of the solar panel payload is to determine if a mile of atmosphere will affect the current generated by a solar array. We will have one device at apogee and one on the ground with the same specs. We will have two so we can see if the current generated is greater higher in the atmosphere. Current will also be logged over time so we can see how current changes over time on its descent and possibly determine the mathematical relationship between altitude and current generated. The hypothesis of the experiment is that the system will see very little difference between the current generated at altitude at the ground due to the limited effect of the extra mile of atmosphere on the energy of the light striking the panel.

The core of our planned payload starts with a BT-300 Tube that is three inches in diameter, and 8 inches long. This tube is the base of the payload. Next we need to make a strong outer structure, so that anything within the body tube won't be damaged. To start off, two centering rings will be epoxied to each end of the BT-300 tube. These centering rings will be epoxied on the top and bottom of the body tube. They will be flush with the edges of the top and the bottom of the body tube.

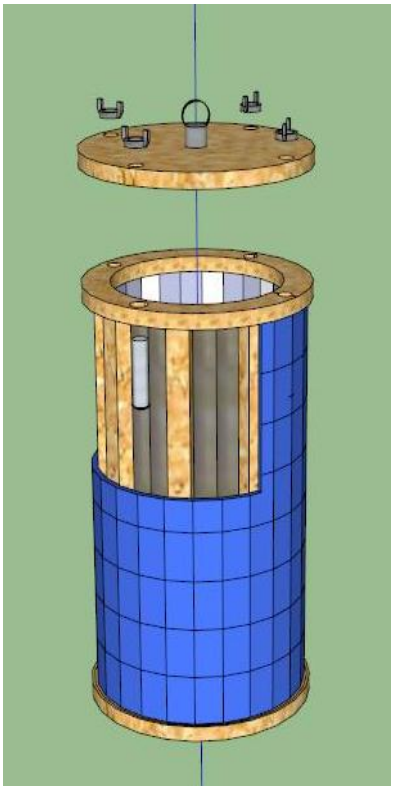
We will have to epoxy a small bulkhead inside the bottom of the BT-300 tube, to close off the bottom of the body tube. This will ensure that when the data logger is within the tube, it won't come out from the bottom of the body tube. To get the data logger in, we will have to leave the top of the tube open. We also need a secure way to cover the open top of the body tube. A simple solution to this requirement would be to put a bulk head on top of the top centering ring. To do this, we plan to make about four holes in the top centering ring. We must also put the same amount of holes in the bulk head to ensure that they will fit together. To connect the two, we plan on using bolts and securing them with glue on the bottom and wing nuts on the top. This system will be removable, so that we can put the data logger in before a launch, and take it out after a launch.

Within the body tube, something needs to secure the data logger in place. The plan is to have it held in place by memory foam. It will need to be form fitted to the altimeter, and also the wires that will be hooked up from the altimeter to the solar panels. The purpose of the foam is to absorb any impact from the launch. Its other purpose is to keep the altimeter and wires connected but also to prevent them from moving within the body tube. This foam will ensure that all of the data recorded is safe, and won't be harmed.



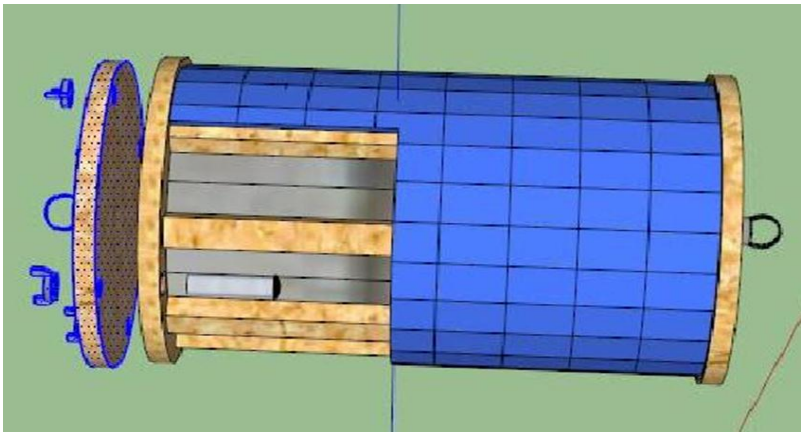
On the outside of the BT-300 body tube we plan on placing vertical wooden trusses to strengthen the payload structure. They will be glued on the outside of the BT-300 body tube. The centering rings overhang the BT-300 body tube, creating a lip where the top and bottom of the wooden trusses can be glued on. This addition to the original structure will give the body tube extra support and prevent any compression of the body tube.

This wooden structure creates channels between the BT-300 body tube and the solar panel. The channels will allow the wires to be run between the BT-300 tube and the solar panel, so that they aren't completely outside of the payload. These wires will run along the channels between the wooden trusses so that they can safely connect the solar panel to the data logger insuring that there is no damage to the wires.



The positive and negative wires will fit through two small holes in the side of the BT-300 body tube. This way, the wires aren't exposed on the outside of the payload, and are safely within it. The wires will be connected to the altimeter, protected in foam, fed through the holes that were made in the body tube, and connected to the solar panel.

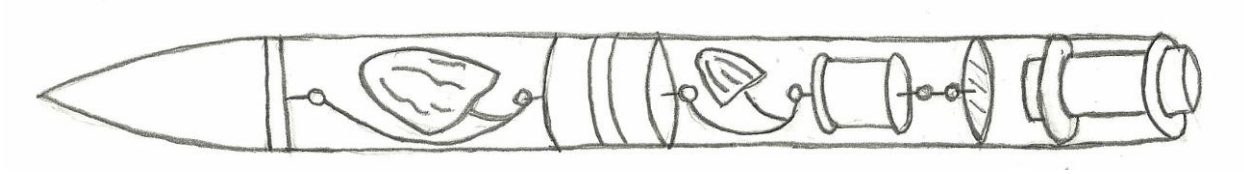
The solar panel will be wrapped around the wooden trusses. We plan on using a flexible solar panel that can be wrapped around the outer structure, and epoxied onto it precisely. The solar panel will be wrapped around the entire cylinder, so that none of the solar panel is wasted. This also creates a 360 degree solar panel for maximum coverage.



This is the entire model, with each item of the payload included. There are two eye bolts on each side of the payload. These eyebolts are necessary to connect the payload to the rest of the rocket. The whole rocket is grouped together. This is so that the components within the rocket are connected; ensuring that no parts will become disconnected and free fall during the flight. The right eye bolt will be connected to the drogue parachute. The parachute will deploy with the payload at apogee. The drogue parachute is directly connected to the payload and the parachute should not cast a shadow on the payload.

When the payload is safely in the rocket, the outer centering rings will keep the payload secured in the rocket's body tube. When the payload is deployed from the rocket at apogee, the payload will be able to gather data. The solar energy will be collected as the rocket descends. The solar panels will collect the solar energy and record the data, with the data logger that is inside of the payload.

e. Vehicle and Recovery System Requirements



The design for the launch vehicle includes an intended altitude of 5280 feet above the ground. The vehicle is designed to remain subsonic (under 1 mach) for the duration of the flight. The rocket is designed to contain a recovery system and proper components to make the rocket recoverable and reusable. The rocket is also designed to only contain three independent sections all tethered together. The launch vehicle shall be constructed before reaching a launch site, so that the rocket is capable of being prepared for flight within two hours from the time the FAA flight waiver opens. The rocket is going to contain the proper components needed to keep the rocket in launch-ready configuration for one hour without losing any of functionality of any onboard components that are critical to the safety and success of the launch. The launch vehicle shall also contain components which would make it compatible with either an eight foot 1010 or a 1515 rail. The vehicle will also be capable of being launch with a standard 12 volt DC current firing system. It won't need external circuitry or special ground support equipment to initiate its launch. The vehicle will make use of a commercially available solid fuel motor propulsion system which uses an ammonium perchlorate composite propellant approved by the NAR, TRA, and the CAR. The proposed motor that was selected should not exceed a total impulse of 2,560 Newton-seconds. The vehicle shall contain no more ballast than 10% of the unballasted vehicle mass. The final rocket design will be flown and recovered in full scale prior to the FRR. The successful flight of the full-scale rocket shall be documented on the flight certification form by a Level 2 or 3 NAR/TRA observer, and then document in the FRR. After successful completion of the full-scale flight, the rocket and its components will not be altered without the concurrence of the NASA Range Safety Officer (RSO). All of our launch vehicles won't, in any way employ forward canards, forward firing motors, titanium sponges, hybrid motors, or a cluster of motors.

The launch vehicle of Spring Grove Area High School has been designed to deploy two separate recovery systems. The first of those two recovery systems is designed to deploy at apogee and consists of a small, drogue parachute. The secondary recovery system, that deploys at a much lower altitude consist of a larger, main chute. This deployment is necessary to reduce the speed of the falling rocket to a safer landing speed. All sections of the vehicle shall have a kinetic energy less than 75 foot pounds of force. The vehicle has also been designed to land within 2500 feet of the launch pad, assuming a 15 miles per hour wind, ensuring the safety of those outside of the 2500 foot radius of the launch pad. The recovery system circuits have also been designed to be completely separate from the payload's electrical circuits. The recovery system of the rocket has also been designed to include commercially available altimeters. The altimeter contained within the recovery system has also been designed by the manufacture to be armed from the outside of the rocket airframe with an arming switch. The altimeter shall have a power supply reserved for the use of the altimeter only. The arming switch for the altimeter will also be capable of being locked in the ON position for the entire duration of the launch. The arming switch for the altimeter must be less than six feet above the base of the rocket. The main parachute compartment and the drogue parachute compartment shall also contain removable shear pins. During flight a functional electronic transmitting device is intended to be placed inside the rocket. It will be used to track all of the components of the rocket. The recovery system electronics have also been incorporated into the rocket design in a way that no other onboard electronic devices adversely affect the recovery system. The recovery system will use low-current, commercially available electric matches to ignite all onboard ejection charges. The electronic ignition system for ejection charges won't use a flashbulb. In addition, a rear ejection parachute design will not be used.

f. Technical Challenges and Solutions

Technical Challenge	Solution
The recovery system electronics interfering with the payload electronics.	The payload will be designed so that it won't emit radio or magnetic waves. This will prevent the recovery system from failing. The payload will be separated from the recovery system so that it will not cause inadvertent failure or excitation of the recovery system electronics.
Creating a rocket that won't go over 5280 feet.	Design the rocket to fly one mile high under perfect conditions. Therefore in experimental launches you will have factors, such as air resistance, that will cause drag.
Designing a rocket that can house a payload and chutes that won't get stuck or tangled during deployment	Design the rocket so that the ejection charges effectively deploy the parachutes and also the payload. Place them in the correct order, or place, in the rocket so that they are successfully deployed.
Designing a protection system for the solar panels	Place a clear, Lucite cylinder around the solar panels, on the payload, to prevent any pressure from damaging the photovoltaic cells. The clear Lucite won't hinder the collection of solar energy that will be collected.
Designing an external access to switch connected to the altimeter to ignite the ejection charges	Consult a Level 2 or Level 3 NAR/TRA representative on the procedure needed for the particular ejection system that was chosen. We should have safe access to the switch on the altimeter that ignites the ejection charges. It shouldn't affect the recovery system or the flight of the rocket.

Educational Engagement

Education is very important to the SLI team. Throughout our project we will be learning how to build a rocket and work as a team. We value these important qualities because they will be necessary during our project and great qualities for our futures. We want the students of the future generation to have these same qualities that we will be developing throughout the project.

We plan to educate at least 250 students from 5th to 9th grade. However, we don't plan on stopping there. In our presentations we will tell the kids about rockets, SLI, and NASA. We hope to inspire kids to build rockets when they're older. We hope to create that initial spark of interest in these programs. We will help them fulfill that initial interest by opening a rocketry workshop. This workshop is for students that would like to build a rocket where they will be able to create their own team. them to build their own rocket in a Rocketry Workshop. It will show them what it's like to build a simple rocket and hopefully inspire them to work with rockets in not only high school, but possibly in an aerospace career. They will be working alongside the SLI team to build their rockets. But, the students don't have to be in those given grades. This workshop will be open to many students so that they can experience this great opportunity, and give them a chance to really get to know what rocketry is all about. Inspiring the future generation is very important, so we hope to do that with our presentations and workshops.

To make the community aware of the NASA SLI program, we will be having presentations in our community. The community's support is very important, so we plan on going to a board meeting and presenting our proposed SLI project. There, a speech will be made about the entire project as a whole. It's also likely that we will go to the Board again when Grants are to be presented to us, and tell them of our progress on the rocket. It will show them what we, as students, are capable of. We can spread awareness of this great opportunity with our community. We can also encourage the community and the children in our community to get the opportunities that they would not otherwise have without the community's support.

In the workshop for the students, they will be able to work with the SLI team personally. We will help them with the construction of a predesigned rocket. There will be two choices of rockets that they can build. If any students are interested in learning how to design a rocket, they can attend a short seminar lead by our SLI team members. The seminar will inform students on how to design a rocket, which will include a simulator to let them experience it for themselves. SLI team members will be standing alongside students to answer any of their questions and help them design a functional rocket design.

To be in the workshop, students will need to have a parent consent form filled out and returned to us before building any part of their rocket. Safety is very important in this project, and won't be taken lightly. Parents are also welcome to attend our informational meeting about the project to educate them on what the workshop entails. We encourage all students to join the workshop, for it will be a great experience they can benefit from. The workshop can help interested students who want to be a part of the rocketry program in the high school. Our SLI team looks forward to working with the future students that will attend the high school.

Project Plan

1. Schedule and Timeline:

    There are two types of congregations that we will be having: meetings and sessions. Meetings will be conducted by the Team Captain and Co-Captain, with Advisor supervision, comments, and recommendations that they may have on the subjects we are discussing. The sessions will be only for members, but will include advisor supervision. These sessions will give us a chance to be completely on our own to work as a team. Our schedule will consist of general meetings, formal meetings, briefings, group sessions, bonding sessions, and work sessions. In the future we will have construction sessions.

Meetings

At our general meetings we will assign what needs to be done by a specific date. They will be short meetings to assign tasks. These meetings will be short, and will be conducted before we start working for the day. These meetings will be informal, with direct tasks and a brief description of the work that needs to be done that day.

At our formal meetings we will have a formal agenda to discuss everything that needs to be done. This is where we will discuss our progress and discuss any problems we have encountered during the week. This will be the time where we can state our independent thoughts and discuss them as a team in a positive manner. Any general questions will be asked and discussed as a team at these meetings.

Our briefings will consist of a report of all work that has been put together collectively. This will be a completely informative meeting. We will not directly discuss what needs to be done at this meeting, but instead we will have a meeting focused on telling the team what is going on. The purpose of these meetings is to inform the team of the changes made to fundraising, the budget, and any minor changes made.

Sessions

Our group sessions will give a chance for anyone to address personal problems or anything they would like to say about their obstacles that have come up when trying to do SLI. This can be a time for them to explain to the group why they have not been able to go to meetings or any personal problems they are having outside of SLI that are affecting their ability to work on their part. As a result, they will be able to get help from other team members who can assist them with their part of the project. These sessions are only for team members, and will be the time when students can confront others about how they like something a team member did, or when they were upset about something a team member did. These sessions are solely made to solve any problems between team members and to alleviate any extra stress that the team members are having in their personal affairs with the team. This will also be an opportunity to express any problems outside of the team, such as a health issue or home issue, that may affect their work. This will help the team get some insight into what is going on, and give us a chance to be more understanding of and compassionate towards other team members. The sessions will give the team a chance to talk about the personal aspects that have been affecting them during the week that they would like to talk about. This will be a more serious session than some of the other sessions.

Our bonding sessions will be a special kind of session, dedicated to the bonding experience of team members and even advisors. The sole purpose will be to connect, outside of SLI. During these sessions we will watch movies dealing with aerospace, rocketry and any group favorites. These meetings are crucial to the development of our team's relationships. These sessions will create a friendly atmosphere and will help us destress and enjoy ourselves with our team.

Work sessions will be dedicated to working on reports. This will give team members a chance to ask other team members questions about their part and any clarifications needed for their part of the report. This will also help the team realize what needs to be done, and give team members a chance to work together and help each other in the process.

We plan on having briefings every Monday's, giving us a chance to compile all of the week's work over the weekend before the briefing. We plan on having formal meetings every Wednesday after school from 3:00 p.m. to 5:00 p.m.

In the future we will be having construction sessions. At these construction sessions, team members will be paired up with another team member while working on any part of the construction of the rocket or payload. This will not only ensure that no mistakes are made, and prevent any accidents from happening. If anything does

happen, their partner will be there and will be able to help them. They will be supervised by an adult when constructing any part of the rocket also. So if something does happen, the partner can inform the supervising adult. Both team members must read any rules and safety procedures before the use of any tool. The partnership will actively engage both members to know the safety of each tool in accordance to making sure that they are safe, and also that their partner is safe. This will also help team members come together and always be working with someone when constructing.

Meeting Times, Session Times and Proposed Schedule

These meeting will be held on different dates. We will be having general meetings every day that we are able to meet, and work together. These general meetings will typically be right before a work session. Our work sessions will be during any of the times that are available after school. Our briefings will ideally be once a week on Mondays from 3:30 p.m. to 4:30 p.m. Our formal meetings will be mandatory meetings and so will our briefings. Our formal meetings will ideally be every Wednesday from 3:00 p.m. to 5:00 p.m. These meeting will be after school, so transportation to these meeting should not be problematic. Our group sessions will be every other week, on Thursday. We will have at least one bonding session a month. The date for this bonding session will be chosen so that all members can come. They will be in accordance to the successful completion of any work, special events, milestones in our project, or outstanding accomplishments. In the future, our construction sessions will be once or twice a week. They will be mandatory on Tuesdays, and Wednesday. Extra days will be assigned to ensure that we stay on schedule. During construction sessions, a team member's partner must be present at the session for that team member to be able to work on the project. These construction sessions will be under the close supervision of an adult. This way, if anything is to happen, there will be someone to attend to the problem or injury.

2. Planned Budget

Our planned budget is approximately $4,695.08 excluding travel and educational engagement. We plan on applying for grants, fundraising and getting donations from the supportive community. This will be crucial to the rest of our project. This opportunity is a once and a life time experience for our school and team, and every little penny counts.

Rocket Component	Details	Item #	Company	Individual Cost	Amount	Cost
Nose Cone	Plastic Nose Cone 16.75" Long w/ a 3" shoulder	PNC-3.9	PML	$21.95	2	$43.90
Body Tube	FGPT-3.9 Fiberglass-wrapped Phenolic Airframe Tubing with pre-cut fin slots	FGPT-3.9	PML	$102.20	4	$408.80
Motor Mount Tube	2.152" ID Phenolic Airframe Tubing	MMT-2.1-18	PML	$6.99	2	$13.98
Drogue Parachute	15" Elliptical Parachute	CFC-15	Fruity Chutes	$35.00	2	$70.00
Main Parachute	Iris Ultra 72" Parachute	IFC-72	Fruity Chutes	$165.00	2	$330.00
Altimeters	Perfectflite *Stratologger*® Altimeters	SL 100	Perfectflite	$79.95	5	$399.75
Altimeter Data Transfer Kit	USB Data Transfer Kit	DT3U	Perfectflite	$29.95	1	$29.95
9 Volt Batteries for Altimeters	9V NiMH Batteries	NM9V	Perfectflite	$10.95	4	$43.80
Fiberglass for Fins	1/8" G10 FR4 Fiberglass (2'x2')	8667K273	McMaster-Carr	$46.68	1	$46.68
Epoxy	1 quart (105 Resin) and .44 pints (205 Hardener)	Epoxy Kit D	Soller Composites	$47.00	1	$47.00
Nylon Shock Cord	1"x25' Tubular Nylon Shock Cord 4200lb. Test	TUNSC-1"X25'	What's Up Hobbies	$19.95	4	$79.80
Shock Cord Protector Sleeve	30" of Kevlar® tubing to slide over the Nylon Shock Cord ($6.95 Shipping)	N/A	Giant Leap Rocketry	$9.44	2	$18.88
Electronics Arming Switch	Key Switches- Type 3	KSW3	Aerocon Systems	$6.00	8	$48.00
Terminal Strip for Ejection Charge	RadioShack® 8-Position European-Style Terminal Strip	274-678	RadioShack	$0.97	2	$1.94
3.9" Electronics Bay	3.9" Electronics Bay Long version + 15" payload tube	EXL-3.9	LOC Precision	$37.95	2	$75.90
Quick Link	1/4" Quick Link	29621	Apogee Components	$3.75	8	$30.00
1/2" Eye Bolts	Armstrong® Forged Carbon Steel Eye Bolt, 1/2-13 UNC, 1 1/2 in Shank (L)	701987	Staples	$5.99	8	$47.92
Centering Rings and Bulkheads	1/2 x 2 x 4 Pine Sheathing Plywood	35663	Lowe's	$8.97	1	$8.97
Motor	Cesaroni - P54-4G Vmax (K2045)	71448	Apogee Components	$113.94	6	$683.64
Motor Casing	Cesaroni 54mm 4-Grain Case	71033	Apogee Components	$84.69	2	$169.38
Motor Retainer	54 mm Aeropack Retainer- P	24067	Apogee Components	$34.00	2	$68.00
Ematches and Ignitors				$5.00	2	$10.00
Spray Paint	Rustoleum		Rustoleum	$5.00	5	$25.00
Parachute Protectors	NOMEX Flame Resistant Wadding Chute Protectors for Rockets - 12"x12"	N/A	Sunward Aerospace Group Limited	$5.69	4	$22.76
Total						**$2,724.05**
Scale Rocket Component	**Details**	**Item #**	**Company**	**Individual Cost**	**Amount**	**Cost**
Body Tube	36" long Pre-glassed Phenolic Airframe Tubing	FGPT-2.1	Public Missiles Limited	$79.45	3	$238.35
Nose Cone	9.50" Plastic Nose Cone	PNC-2.1	Public Missiles Limited	$13.95	2	$27.90
Tube Coupler	36" Phenolic Coupler Tube	CTF-2.1-36	Public Missiles Limited	$12.50	1	$12.50
Motor Mount Tube	1.525" ID Phenolic Airframe Tubing	MMT-1.5-18	Public Missiles Limited	$5.78	2	$11.56
Main Chute	42" Classical Elliptical Parachute	CFC-42	Fruity Chutes	$80.00	2	$160.00
Drogue Chute	12" Classical Elliptical Chute	CFC-12	Fruity Chutes	$33.00	2	$66.00
Motor	Cesaroni P38-3G Blue Streak (I236)	71333	Apogee Components	$41.35	4	$165.40
Motor Casing	Cesaroni 38mm 3-Grain Case	71022	Apogee Components	$40.93	2	$81.86
Fiberglass for Fins	G10 FR4 Fiberglass Sheeting	8667K241	McMaster Carr	$14.13	1	$14.13
Wood for CR and BH	1/4x12x16 5 ply Poplar Lite-Ply	PLY14L-16	Balsa Machining Services	$3.90	1	$3.90
Shock Cord	Tubular Nylon Shock Cord1/2"x10' 1000lb test	TUNSC-1/2"x10'	What's Up Hobbies	$10.95	4	$43.80
Shock Cord Protector	Kevlar Shock Cord Protector- 30" Long	N/A	Giant Leap Rocketry	$9.44	2	$18.88
1/2" Eye Bolts	Armstrong® Forged Carbon Steel Eye Bolt, 1/2-13 UNC, 1 1/2 in Shank (L)	701987	Staples	$5.99	8	$47.92
Motor Retainer	38mm AeroPack Retainer-P	24063	Apogee Components	$29.00	2	$58.00
Ematches and Igniters				$5.00	2	$10.00
Terminal Strip for Ejection Charge	RadioShack® 8-Position European-Style Terminal Strip	274-678	RadioShack	$0.97	2	$1.94
Epoxy	1 quart (105 Resin) and .44 pints (205 Hardener)	Epoxy Kit D	Soller Composites	$47.00	1	$47.00
Electronics Arming Switch	Key Switches- Type 3	KSW3	Aerocon Systems	$6.00	8	$48.00
Quick Link	1/4" Quick Link	29621	Apogee Components	$3.75	4	$15.00
Parachute Protector	NOMEX Flame Resistant Wadding Chute Protectors for Rockets - 9"x9"	N/A	Sunward Aerospace Group Limited	$4.89	4	$19.56
Spray Paint	Rustoleum		Rustoleum	$5.00	4	$20.00
Total						**$1,111.70**
Payload Component	**Details**	**Item #**	**Company**	**Individual Cost**	**Amount**	**Cost**
Datalogger	USB Current Datalogger	WO-23039-56	Davis Instruments	$75.25	2	$150.50
Wood for Bulkheads	1/4" x12" x16" 5 ply poplar Lite-Ply	PLY14L-16	Balsa Machining Services	$3.90	1	$3.90
BT300	BT300 Phenolic Tubing (36")	PT-3.0	PML	$16.50	1	$16.50
Memory Foam	TRAVEL SIZE Memory Foam Molded Contour Neck Pillow	N/A	Z by Malouf	$13.99	1	$13.99
Lucite Cylinders	Plexiglass - Clear Cast Acrylic Tube	ACRCAT3.875ODX.125	Eplastics	$36.01	2	$72.02
Solar Panels	7.2V, 200mA 10.0"x5.9"x0.02" Rollable Solar Panel	S-MP7.2-150	PowerFilm	$35.95	2	$71.90
Total						**$328.81**
Travel Expenses						**Cost**
Travel to Huntsville	School Vans					$1,640.00
Lodging	Hotel					$4,165.00
Food						$2,730.00
Travel to practice launches						$0.00
Total						**$8,535.00**
				Overall Total		**$12,699.56**

3. Funding Plan

We have a few different sections for the funding plan. The first is fundraising, the second is grants and the third is donations. We have a coordinator that deals with all of these sections.

Fundraising

We are in the brainstorming stages for our fundraising. Any fundraisers that we would like to do must be approved by our fundraising coordinator. We have a few ideas for our fundraising, and they will be worked on and expanded in the next month. There will be a few different kinds of fundraising. One way we plan on fundraising is to have events that will raise money. We will also be selling products within our community to raise money and awareness of our project. Fundraising is a huge part of our project. We will be fundraising until the completion of our project. We will have to raise enough money to pay for our trips for practice launches and our trip down to Huntsville, Alabama.

Grants

We have already applied for a few grants, and already gotten one. Our first Grant was from MetEd. This grant was worth 500 dollars. This grant was presented to us at our District Board Meeting on October, 15th. We also got a mini grant from the Education Foundation. This grant was for $1000. We plan on applying for many more grants, and hope to represent many foundations and businesses with our acceptance.

Donations

We welcome any donations. Any donations made will be credited on our site. These credits will be on our Team Website, along with the credits of what was donated. This will inform the community, of the support we are getting from companies and businesses that have supported us. We also welcome sponsors. Our sponsors will also be on our Team Website. Our sponsors will have special advertising opportunities throughout our project.

4. Community Support

To get the support of our community we have already presented our SLI project at a board meeting. At this board meeting, we presented our proposal with the assistant of a blueprint and a prototype. At the meeting the administration discussed our trip to Huntsville, Alabama. This was discussed after our presentation. In our community we will also be giving presentation within our school district. We plan on having an informative assembly for all students from kindergarten to 9th grade. With these selected grade levels, we will be having four separate assemblies. One assembly will be for kindergarten through 4th, the next will be for 5th and 6th, another one will be for 7th and 8th, and the last one will be for 9th grade. These assemblies' will give the teachers, students, and even the parents of students to be informed on our project. These presentations will have an influence on the community. We hope for feedback that will show us that students are inspired and interested in our project, and their parents are supportive of our project. We also will have fundraising within our community to show how much work we are putting into our project. To be successful in the funding for our trip, we will need the communities help and support.

5. Sustainability of Rocket Project

With all of the fundraising, educational engagement, and media of our project, we should have no problem with sustaining our project. One great gateway to the spread of knowledge of our project is through our school district. Through our educational engagement we will continue to engage students in the recruitment of rocketry projects including SLI. In our community we will communicate with our sponsors and the people who have donated money or supplies to us. We hope to create and develop close and personal relationships with our sponsors to sustain their support in our project. A possible way to keep our sponsors consistently informed with our project is for them to follow us on our website and Facebook page. This will be an easy way for them to keep updated without any hassle. They can also meet with the team or our advisors if they would like to. These two websites are open to

the public, and will be a great resource for both industries and the community. To sustain our funding we plan on consistently have fundraisers, and informing others of our project.