

AIAA NCS Completes Science Fair Marathon for 2008

Edited by Mike Hirschberg, CENTRA Technology, Inc.
Pre-College Education Chair

This spring, members of the AIAA National Capital Section (NCS) completed our annual marathon of science fair judging. A total of 25 volunteers judged aerospace-related projects at eight local science fairs, spanning the entire scope of science fairs in the official NCS jurisdiction – from the shores of the Chesapeake Bay to the border of West Virginia.

We were able to continue our full coverage this year to all of the jurisdictions that have science fairs in the metropolitan area: Northern Virginia (which includes Arlington, Alexandria and Falls Church), Fairfax Co., Loudoun Co. and Prince William Co. in Virginia, Montgomery Co., Prince George's Co. (which includes St Mary's and Calvert Counties), and Charles Co. in Maryland, and Washington, D.C.!

Thanks to the generous support of our corporate sponsors – *The U.S. Space & Rocket Center, BAE Systems, The Campbell Marketing Group, Integrity Applications, Lockheed Martin, and Rockwell Collins* – AIAA NCS was able to provide over \$13,000 worth of prizes to our winners.

AIAA awarded prizes to students with the top three aerospace-related projects at each fair, for a total of 27 prize winners (additionally, certificates were given out to deserving Honorable Mention students). Prizes for the top three winners include the following:

- 1st Prize is a week at the US Space & Rocket Center's Space Camp or Aviation Challenge (www.spacecamp.com)
- 2nd Prize is \$100
- 3rd Prize is \$75

All three of the top winners at each fair are also offered a one-year student membership in AIAA and invitations to display their projects at the annual NCS Awards Banquet on June 17th. Save the date to attend the awards banquet and you can see for yourself the impressive work by these future science and technology leaders of America.

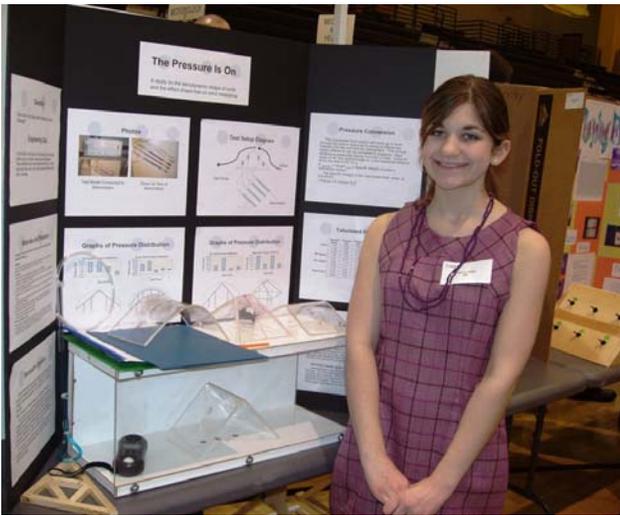
Charles County Science Fair

The Charles County Science Fair was held on Saturday March 1 at North Point High School, Waldorf, MD. The AIAA NCS judges were Mike Hirschberg (CENTRA Technology), Michael Poliszuk (NAVAIR), and Allan Osborn (The Aerospace Corporation).

First prize was awarded to eighth grader Cayley Dymond of Matthew Henson Middle School for her project entitled "The Aerodynamics of Different Satellite Shapes." She used a novel balance arrangement to measured the drag on 7 different satellite shapes that were based on satellites either currently in orbit or planned for launch. She determined that an ovoid shape provides the lowest drag.



Second prize went to Victoria Ritter of La Plata High School for her project, "The Pressure is On." Victoria developed an innovative wind tunnel to measure pressure exerted by the wind on 4 different roof shapes. To measure the pressure exerted by the wind, she built a manometer after consulting with a University of Maryland wind tunnel specialist; for her tests she attached the manometer to holes placed at several locations on the test specimens.



Sean Conley, won third place for his project, "Does the Shape of a Boat Hull Affect its Drag?" Sean built a water test section and installed several hull shapes, representing a catamaran, a v-hull, and a flat bottomed boat, and flowed water past the test shapes. Using a spring scale attached to the test section, Sean determined that the catamaran shape had the least drag.

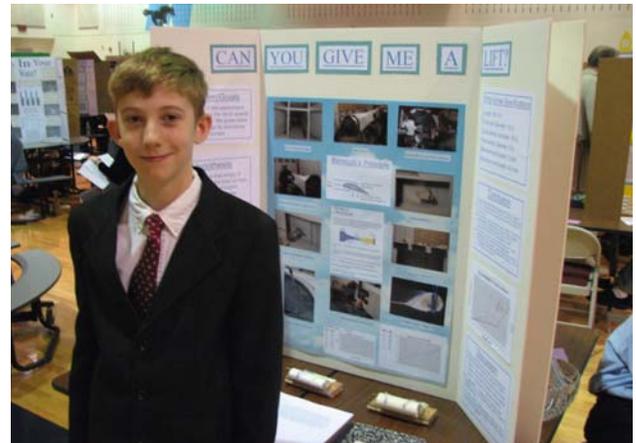


Honorable mentions were awarded to Kelsey Rawson for "Against the Wind" in which she studied the effect of wind direction on the speed of a sailboat sail, and Matthew Barnett for "The Effect of Propellant Temperature on Projectile Velocity and Trajectory."

Prince William-Manassas Science Fair

The Prince William-Manassas Regional Science Fair was held on Saturday March 8th at Metz Middle School in Manassas. AIAA NCS judges were Joe Marshall (BAE Systems), Jim Armor (Maj Gen, USAF (retired), space consultant) and Josh Powers (Scitor Corporation).

First prize was awarded to Middle School Student Steven Shaw for his project entitled "Can You Give Me a Lift?" Steven built his own wind tunnel, calibrated the speed by holding instruments while a car was driven at different speeds, and then compared three different wing designs.



Second place was awarded to High School Student Kevin Coffey for his project "In the Heat of the Light". He looked at the effects of very low light level inputs on solar cell outputs by using filters. He built his own light measuring equipment setup with Fresnel lens and worked through challenges brought on by thermal effects.



Third Place went to High School Students David Dodge and Adishesh Narahari for their project named “Chuckernaut”. They built a trebuchet and did extensive performance trials while adjusting trebuchet attributes, and then research on comparing it with others built when their data from various trials was different. They performed safe trials and came up with an aiming mechanism when its direction varied too greatly.



An Honorable Mention was awarded to Middle School Student James Heiertz for his project “Wings of Change”. He built cardboard extensions for a styrofoam airplane to test the effects of wing chord length. He also designed a custom system to ensure repeatable launch conditions. An Honorable Mention also went to Middle School Student Clayton Shablom for his project, “The Wright Phoenix”. He looked at the lift caused by different distances between wings on a bi-plane. He built his own wind tunnel and adjusted its design to match the scale of his bi-plane wings so as to get useful comparisons.

Northern Virginia Science Fair

The Northern Virginia Regional Science and Engineering Fair (covering Alexandria, Arlington and Falls Church) was held at Wakefield High School in Arlington, VA on Saturday, March 8. Judges were Joe Chan (Intelsat), Tom Marino (Dept of the Navy) and Francis Szalay (Orbital Sciences Corp).

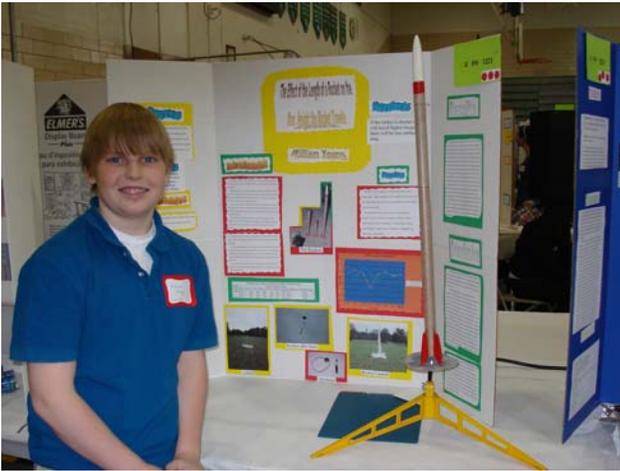


First place went to Benjamin Giobbi for his project, “The Hunt for a No Moving Parts Propulsion System.” Benjamin set up the experiment to study a propulsion system based on the magnetohydrodynamics principle in which magnetic fields are used to move fluid where there are no moving parts. In his experiment Benjamin used a small boat in salt solution for demonstration. He was able to show limited motions of the small boat in the environment. This technology is typical for ships and submarines and there are still a lot of issues need to be resolve to apply this technology for planes and space vehicles.



Second place was awarded to Nicolas Zevallos. His project was called “The Effect of Vent Size on Parachute Descent.” Nicolas studied the descent stability with different vent sizes at the center of a parachute. He made openings of different sizes on parachutes and observe the descent stabilities as he dropped the parachutes in a semi-controlled environment. The concept is that opening in the parachute will allow more consistent flow of air and thus

minimize the disturbance to the descent of the parachute. He concluded that larger openings in the parachute do improve the stability of descent.



Third prize was awarded to William Young for his project, "The Effect of the Length of a Rocket on the Maximum Height Traveled." William studied the frictions of the rocket bodies and the impact on the maximum height traveled. He made different rockets with varying heights but he made sure that the weights for the different rockets are identical. He then launch the rockets with same size engines and measured the maximum height traveled. He concluded that rockets with longer bodies have a lower maximum height traveled than rockets with shorter bodies.

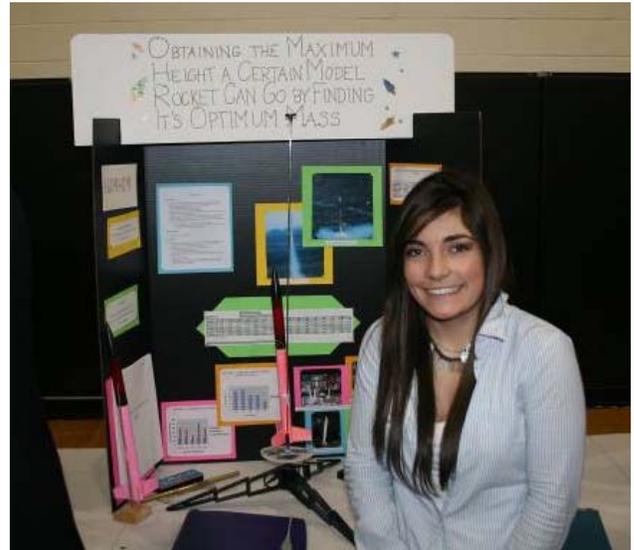
Honorable Mention's were also given to Lisa Carlson for "Varying the Efficiency of Solar Cells" and Aidan Thayer for "How Do Different Wings Affect the Flight of an Airplane."

Loudoun County Science Fair

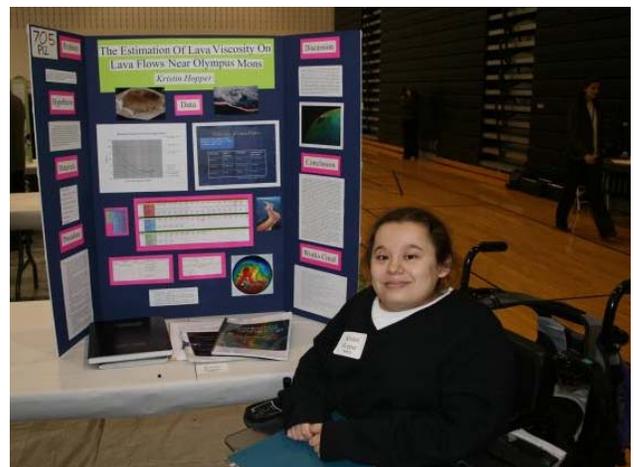
The Loudoun County Regional Science and Engineering Fair was held on Thursday, March 13, at Dominion High School in Sterling, Virginia. The AIAA NCS judges were Michael McFarland (Orbital Sciences Corporation), Carlos Niederstrasser (Orbital Sciences Corporation), Michael Collins (ASRC Management Services), and William Michaux (GeoEye).

First prize was awarded to Jessica Picone, a freshman at Heritage High School, for her

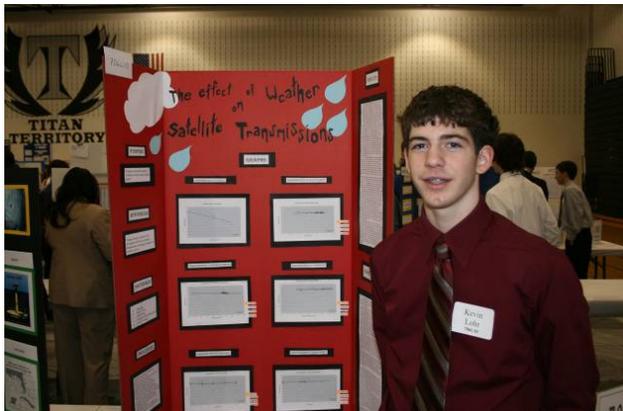
project entitled "Obtaining the Maximum Height a Certain Model Rocket Can Go By Finding Its Optimum Mass." Jessica completed seventy-five model rocket launches, including fifteen trials with each of five different payload weights, and measured the altitude at apogee using a homemade sextant. She determined that a payload weight equal to 4% of the rocket's empty weight achieved the highest altitude.



Second prize went to Kristin Hopper, a senior at Dominion High School, for her project on "The Effects and Variability of Viscosity on Lava Flows Near Olympus Mons." Kristin compared digital imagery of the Martian volcano's lava flows with similar images of volcanoes on Earth. She used measurements of the length, width, and depth of lava flows to estimate their viscosity and to illustrate similarities between volcanoes on Earth and Mars.



Kevin Lohr, a sophomore at Loudoun Valley High School, won third place for his project, "How Weather Affects Satellite Signals." Kevin used the signal meter feature in his satellite television receiver to measure the effects of barometric pressure, relative humidity, temperature, cloud coverage, and rainfall on signal strength. His results showed that of these phenomena only rainfall has a significant effect on satellite television reception.



Honorable mentions were awarded to Tasia Paraskevopoulos for "The Effect of City Plan on Airflow and Pollutant Dispersal," in which she simulated pollutant dispersal by injecting colored sand into a wind tunnel apparatus containing a simplified city model, and Babek Pourkazemi for "The Effect of Increasing the Blade Length of a Horizontal Wind Turbine on the Volts Produced."

District of Columbia Science Fair

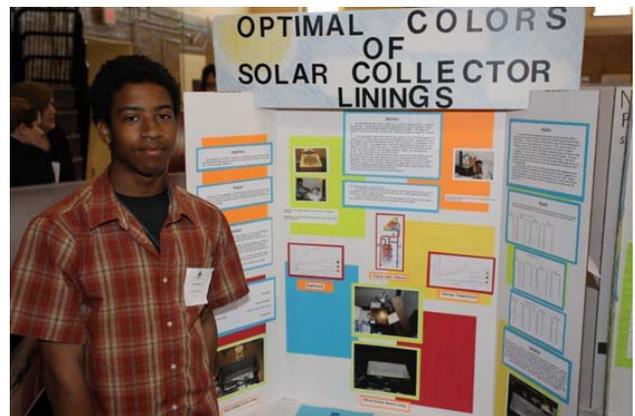
The DC Science Fair was held at the McKinley Technology High School in Washington, DC, on March 15. The AIAA judges were Claudio Caprio (BAE Systems), Kimberly Harris (Lockheed Martin), and Nils Jespersen (The Aerospace Corporation). The judges were very impressed with the caliber of creativity of the students and their projects. Determining the winners was a tough challenge.

First Place went to Tiaira Jones, an eighth grader from Takoma Educational Center. She presented a project entitled "Alka Rocket". She used a film canister with a hole in the center as the fuel reservoir for a rocket which she very creatively constructed out of 3"x5" note cards.

The fuel for her rocket consisted of a controlled quantity of water into which she placed controlled sections of Alka-Seltzer™ tablets. Her experiment consisted of several trials each of measuring the height to which the rocket attained (no flight was higher than about 12"), while varying the water temperature and the quantity of Alka-Seltzer™ introduced.



Second Place went to Adam Roberts who is a tenth grader at Woodrow Wilson SHS. His project was entitled "Optimal Colors of Solar Collector Linings". Adam constructed an innovative test structure from a fish tank which he lined with various materials with different colors, and illuminated, with a heat lamp, from above. He did controlled measurements of temperature within the heated space by using a thermometer in a beaker of water.



The Third Place award went to Matthew Haynes and Graeme Leddy, a two-student eighth grade team, with a project called "The Combustion Cannon". The team constructed a cannon out of PVC pipe materials, incorporating a spark igniter in the combustion chamber, and used this apparatus to investigate effectiveness

of various types of fuel to launch a rubber ball projectile. They placed the cannon at a 33° angle and measured the distance the ball traveled with the different fuels (alcohol and various spray products such as hair spray and deodorants). For each trial, they carefully metered the fuel and ensured that the ball was placed consistently within the firing tube.



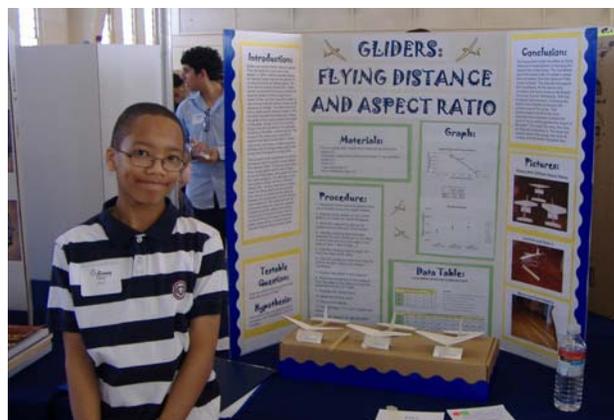
ScienceMontgomery

The Montgomery County Science Fair was also held on Saturday March 15th at Montgomery County Fair Grounds in Gaithersburg, MD. The judges were Ed Habib (Hab-Com, Inc.), Kevin Leath (Boeing), and Jos Galvis (Amazon Mtg).

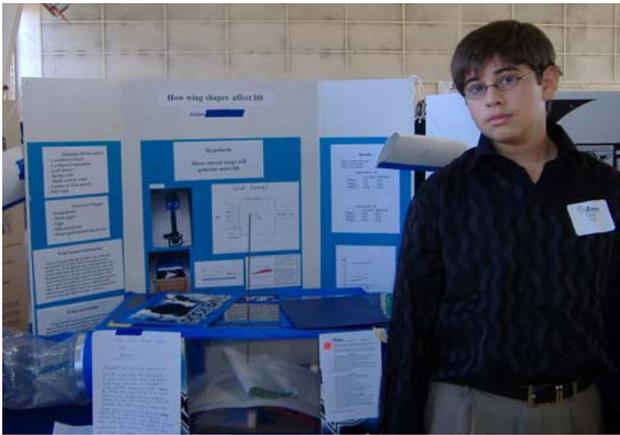
First place went to Daniel Rivers, a Junior division student from Parkland Middle School. His project, entitled "The Effects of Blade Pitch on Wind Turbine Efficiency," was a well thought-out assessment of energy capture as a function of optimal blade twist. Daniel displayed clear understanding of both the electrical engineering and aerospace principles involved in the project. His discussion of the work was well presented, and he performed well when questioned by the judges.



Second place went to Ollen Douglass, a Junior division student from Cabin John Middle School. Ollen's project, entitled "Gliders: Effect of Aspect Ratio on Flying Distance," compared wing aspect ratios of similar airplane models to distance travelled in order to find a correlation between wing design and performance. Ollen modified the models to achieve the aspect ratio variations, and used a good technical approach to reduce the effects of unwanted variables such as launch force.



Third place went to Julian Raul, a Junior division student from St. Andrew Apostle School. His project, entitled "How Wing Shapes Affect Lift," investigated wing cross-sectional shape effect on lift. Julian constructed his own wind tunnel and used an innovative approach to measure lift by inverting the wing sections over a scale in the wind tunnel.



Honorable Mention went to David LoBosco, a Junior division student from Earle B. Wood Middle School. His project, entitled "Sizzling Hot Rockets," investigated the relationship between engine thrust and time of flight. An Honorable Mention also went to Kelvin Chang and Manju Shivacharan, Junior division students from Parkland Middle School. Their project, entitled "Rocket Aerodynamics: Which Nosecone is Most Aerodynamic?," looked at the optimal nosecone shapes for minimal drag. Their approach made good use of basic techniques and controls for input variables such as launch force.

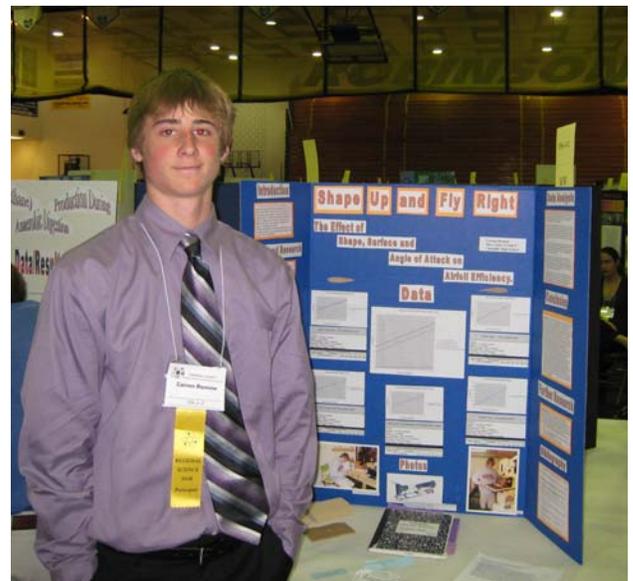
Fairfax County Science Fair

The Fairfax County Regional Science and Engineering Fair was held on Saturday, March 29th at Robinson Secondary School in Fairfax, Virginia. The AIAA judges were Sean Griffin (Dept of Navy), David Brandt (Lockheed Martin) and Kevin Bollino (US Air Force).

The AIAA NCS judges awarded First Place to Robert Meyer, a 10th grader at Robinson Secondary School, for his original work entitled, "Effect of Length on Forces on a Rotating Airfoil." Robert hopes his work will provide a foundation for windmills that use blades that spin about their own axes, which he believes is safer for birds.



Carson Romine, a 9th grader at Chantilly High School, earned second place for his work entitled, "Effect of Shape and Angle of Attack on Airflow," where he examined the effects of camber using both M&S and experimental wind tunnel testing. Carson showed originality when he examined the effect of increasing surface roughness on the underside of the wing, which he hoped would lead to slower airflow along that side of the wing and thereby increased lift.



John Hill, a 9th grader at Fairfax High School, built a wind tunnel and earned Third Place for his work entitled, "Effect of Pitch on Wind Turbine Effectiveness."



The judges awarded Honorable Mention Awards to Dhiman Sengupta, an 11th grader at Westfield High School, and John LaBelle, a 10th grader at Langley High School, for their projects, “The Effect of Wing Shape on Lift and Drag” and “Effect of Rocket Nose Cones on Altitude,” respectively.

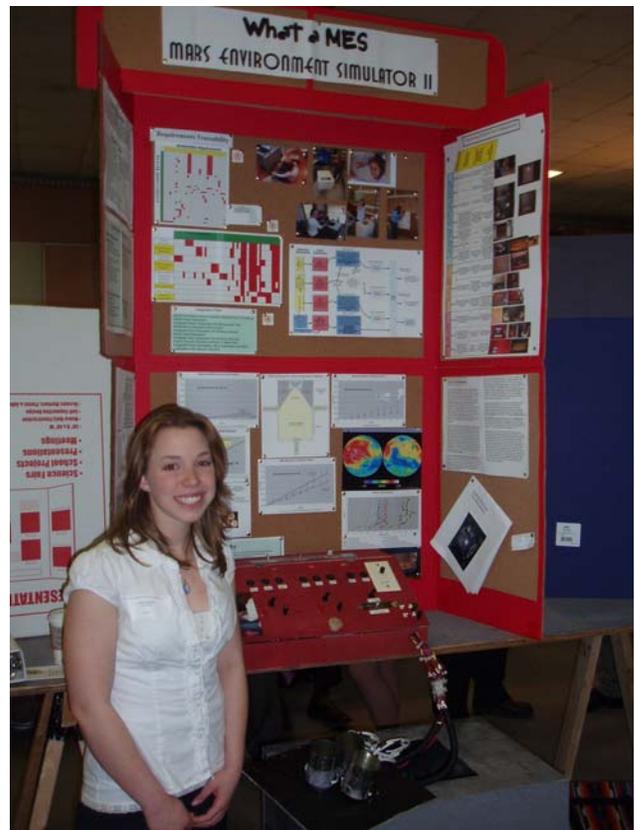
Prince George's Area Science Fair

The final AIAA NCS-area judging was conducted at the Prince George’s County Science Fair, also held on Saturday March 29th, at the Prince George’s Community College and included entries from Prince George’s, Calvert and St Mary’s Counties. The judges were Ron Muller (Perot Systems), Karthik Balakrishnan (University of California, San Diego) and Veronica Leonard (Lockheed Martin).

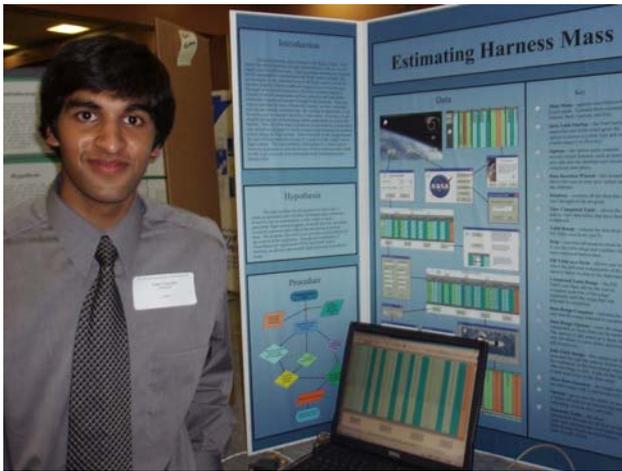
First Place was awarded to the team of Kristina Dronenburg and Bethany Schaeffer both from Great Mills High School for their project titled “Punching Out Won’t Hurt That Bad.” They modeled the combined aerodynamic and acceleration forces on a pilots head during ejection from an aircraft. They observed the air flow in a wind tunnel.



Second place was awarded to Julie Walker from Leonardtown High School for her project titled “What a M.E.S. Mars Simulator II” She developed an environment simulator that can reproduce some of the environmental conditions of Mars.



Third place was awarded to Ankit Chaudhari from Eleanor Roosevelt High School for his project titled “Estimating Harness Mass” He developed a computer program that calculates the mass of a satellite harness. It has a very user friendly interface.



Two Junior Division students were given Honorable Mention Awards. One was given to Jessica Nicole Miles of Spring Ridge School for her project titled "Rocket Stability: Exploring Various Stability Devices." She tested three different model rocket tail designs to see which performed best. The second Honorable Mention was given to Nicholas Ey of Martin L. King, Jr. Middle School for his project "What a Drag...or Is It?" He built a wind tunnel and measured the drag of various model aircraft wing designs.



Plans for Next Year

In 2009, we hope to continue our science fair judging, but we won't be able to do this without continued corporate and volunteer support. If you are interested in getting more involved in National Capital Section educational outreach programs, please contact Mike Hirschberg, the Pre-College Education Chair at 571-218-4417 or aiaancs.sciencefair@comcast.net.

Note that even if your favorite student isn't one of our science fair winners, they can still have

an out-of-this-world experience at Space Camp or Aviation Challenge. Visit their website at <http://www.spacecamp.com> or call 1-800-63-SPACE (800-637-7223). When registering, please use code "AIAA08". This helps to underwrite the cost of the science fair award scholarships.

Again a special thanks to our corporate sponsors:

- The U.S. Space & Rocket Center
- BAE Systems
- The Campbell Marketing Group
- Integrity Applications
- Lockheed Martin
- Rockwell Collins

And our judging teams:

- Michael Poliszuk, NAVAIR
- Allan Osbourn, Aerospace Corporation
- Mike Hirschberg, CENTRA Technology
- Mike McFarland, Orbital Sciences Corp
- Carlos Niederstrasser, Orbital Sciences Corp
- William Michaux, GeoEye
- Michael Collins, ASRC Management Services
- Sean Griffin, Dept of Navy
- David Brandt, Lockheed Martin
- Kevin Bollino, US Air Force
- Joe Marshall, BAE Systems
- Jim Armor, consultant
- Josh Powers, Scitor Corporation
- Joe Chan, Intelsat
- Tom Marino, Dept of the Navy
- Francis Szalay, Orbital Sciences Corp.
- Nils Jespersen, Aerospace Corporation
- Claudio Caprio, BAE Systems
- Kimberly Harris, Lockheed Martin
- Edmund Habib, Hab-Com, Inc
- Kevin Leath, Boeing
- Jos Galvis, Amazon Mtg
- Ron Muller, Perot Systems
- Karthik Balakrishnan, University of California, San Diego
- Veronica Leonard, Lockheed Martin