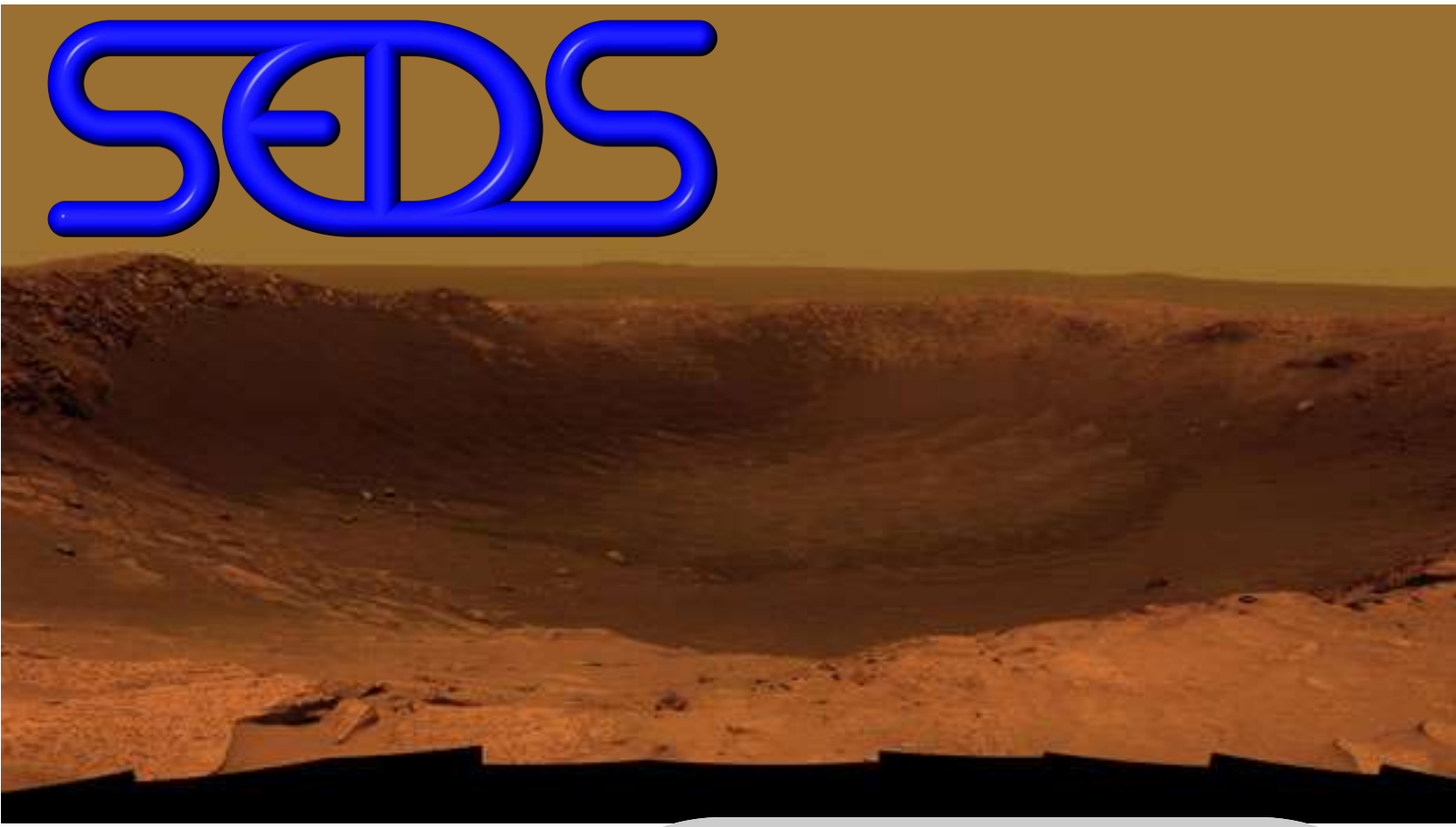
SEDS

4th Quarter 2010

nova

The official publiciation of SEDS-USA



Front Page: Although observatories have traditionally been limited to the ground and ***space, SOFIA, NASA's Airborne*** *Observatory, breaks this pat-* ***tern with it's 100 inch diameter*** *telescope. Image Credit: NASA*

Above: The Martian crater ***known as "Santa Maria," as*** *viewed from the Mars Exploration Rover Opportunity. Image Credit: NASA/JPL*

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the official publication of SEDS-USA

SEDS members, alumni, and friends,

Welcome to the latest edition of the SEDS NOVA newsletter, celebrating the end of the 30th anniversary year of SEDS! It was great to see so many of you in person in Illinois in November for the annual SEDS-USA SpaceVision conference. Many thanks again to the Illinois Space Society for hosting one of the most successful conferences of the last few years and bringing together hundreds of people to envision the future of space exploration and learn about current developments. I hope that all attendees made many good connections with other students and professionals and that the industry exhibition introduced many students to potential future employers. I trust that the SpaceVision 2011 conference in Boulder, Colorado will be just as exciting and will feature just as many amazing speakers and companies that are making waves in the space industry!

This edition of the NOVA features a special section to introduce you to the new board of SEDS-USA. I was incredibly happy that many of the positions on the 2010-2011 board of SEDS-USA were contested between multiple students this year. At this time of growth for SEDS-USA, it is good to see that so many people are willing to get involved on the national level and to help provide assistance to chapters as they work to provide leadership and learning opportunities for their student members. While I am glad to have many highly experienced SEDS members on the board, many board members will graduate this year, so if you or a friend are new to SEDS and willing to devote some of your time to supporting over two-dozen SEDS chapters, consider helping the board this year or applying for a position next November to help keep our student organization strong. To get started, just contact me or one of the current board members today!

As you enjoy your winter vacations and begin your spring semester, keep in mind that now is the time to apply to internships for next summer. Take the time to look at the opportunities available with corporations like Boeing, Lockheed Martin, and Northrop Grumman but also send an application to the smaller space companies like Masten Space Systems or maybe SpaceX. Another time-tested route of study that has been taken by many SEDS leaders is participation in one of the NASA Academies or simply one of the many NASA summer internships, which are now all available on a single website at intern.nasa.gov.

Finally, as the 30th year of SEDS draws to a close, I want to let you know that the new executive board is once again focused on the future of SEDS-USA and working to build the SEDS-USA Endowment Fund. The endowment fund was created a few years ago with the help of many SEDS Alumni and through the hard work of former Director of Finance Ryan Goodnight. The endowment is an investment made on behalf of SEDS and designed so that SEDS can use the return on investment as an annual operating budget, to fund contests, projects, initiatives, printing, and other tools that help our chapters nationwide. This year we need your help to find donors willing to help finance the future work of SEDS through the endowment. We are now actively seeking year-end donations from friends and alumni this December, but even at the current rate, it will take a few years to make the endowment profitable. Please help us by sharing SEDS with your family and friends this new year and asking them to help us provide students with experiences they don't get in the classroom.

Thanks for your continued hard work and support of SEDS and our mission. Remember that YOU can make a difference in the future of space travel and space exploration. Take the initiative, get involved, and do something to make a difference!

Ad Astra,

Rick Hanton

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Sixth grader dubs the Mars Science Laboratory "Curiosity"

By: Anna Ho, SEDS-USA Director of High School Affairs

Above: The signed body of Mars Science Laboratory, done in a clean room at JPL in Pasadena, California.
Image Credit: NASA/JPL-Caltech

A sixth grade student from the Sunflower Elementary school in Lenexa, Kansas, has won NASA's nationwide competition to name the Mars Science Laboratory. Submissions included both a name and an essay explaining why the suggestion would be appropriate, and were judged by a NASA panel primarily on the quality of the latter. Over 9,000 proposals – representing suggestions from the Mars Science Laboratory project leaders as well as students from every state – flooded in online and through the mail. To Mark Dahl, mission program executive, this demonstrates "the excitement Mars missions spark in our next generation of explorers".

Excitement, one could argue, is a powerful force behind scientific inquiry. Clara Ma, the winner, named the Mars Science Laboratory after another powerful force: curiosity. "Curiosity is such a powerful force," Ma wrote in her essay. "Without it, we wouldn't be who we are today. Curiosity is the passion that drives us through our everyday lives. We have become explorers and scientists with our need to ask questions and to wonder. Sure, there are many risks and dangers, but despite that, we still continue to wonder and dream and create and hope." Ma's prize was to be flown to NASA's Jet Propulsion Laboratory for a VIP tour, where she signed the rover.

Curiosity is scheduled for launch in 2011, and "will be larger and more capable than any craft previously sent to land on [Mars]" [1] . It is searching for evidence that the environment on Mars has ever been able to support life, as part of NASA's Mars Exploration Program. Using a record number of advanced instruments, the rover will analyze rock and soil samples to reconstruct this environment's history. When it lands in 2012, the rover will usher in a "new decade" of landing technology and mission flexibility. The NASA website describes some of the innovations as follows:

> The spacecraft will descend on a parachute and then, during the final seconds prior to landing, lower the upright rover on a tether to the surface, much like a sky crane. Once on the surface, the rover will be able to roll over obstacles up to 75 centimeters (29 inches) high and travel up to 90 meters (295 feet) per hour....The rover will carry a radioisotope power system that generates electricity from the heat of plutonium's radioactive decay. This power source gives the mission an operating lifespan on Mars' surface of a full Martian year (687 Earth days) or more, while also providing significantly greater mobility and operational flexibility, enhanced science payload capability, and exploration of a much larger range of latitudes and altitudes than was possible on previous missions to Mars.[2]

The rover will bring Mars closer to Earth by collecting information, but it will also bring people on Earth closer to Mars; a microchip mounted on the rover contains the electronic signatures of thousands of people from around the world. Before winning the contest, Ma thought that "space was something I could only read about in books and look at during the night from so far away". As thousands of human signatures and a rover bearing a name from a sixth grader's imagination land on Mars, the red planet will certainly have become, in Ma's words, "one step closer."

Above: Engineers test spin the newly installed wheels on Curiosity.
Image Credit: NASA/JPL-Caltech

[1] http://marsprogram.jpl.nasa.gov/msl/mission/overview/
[2] http://marsprogram.jpl.nasa.gov/msl/mission/overview/

The SEDS-USA Endowment Fund

Greetings SEDS Members, Friends, and Visitors,

Four years ago, the leaders of SEDS-USA, along with our founders and advisers crafted an ambitious goal for the organization. They decided that SEDS needed to create an endowment fund to ensure the long term financial viability of SEDS-USA. First, before they could create this endowment, SEDS-USA needed to become registered as a 501c3 corporation with the IRS. In 2009, SEDS earned this important recognition and we are now able to solicit tax-deductable donations from individuals and businesses to support the endowment campaign.

Once the endowment fund is operational we will leave the endowment principal untouched to gather interest. SEDS-USA intends to use the return on investment from the SEDS Endowment to fund an annual budget. This budget includes funding student projects at chapters around the country, funding travel scholarships, funding student competitions, providing support for the SEDS National SpaceVision Conference, and supporting science, technology, engineering and math educational outreach nationwide.

For the last two years, we have been seeking donations to the SEDS-USA Endowment Fund to support the long-term mission and goals of SEDS. We have collected some donations from alumni and donors within the space industry, but we have not collected enough to actually begin investing the money in the endowment. Thirty years after the creation of SEDS, we are striving to get enough donations for the endowment to become a reality by our next national conference in November 2011.

In 2011 SEDS-USA hopes to raise seventy-five thousand dollars for the endowment fund. If SEDS meets this goal, it will allow the fund to become operational and begin to fund SEDS-USA activities. After the fund becomes operational we will continue to look for more donations to bolster the fund and allow us to better support our future initiatives. Right now, we ask each member and friend of SEDS-USA for your support in this critical endeavor. If you want to learn more or have questions, please contact finance@seds.org or endowment@seds.org for more information.

Thank you,

Rick Hanton
Chairman, SEDS-USA

Sara Merchberger
Vice-Chair, SEDS-USA

Christopher Ogden
Finance Director, SEDS-USA

A Look Back at SpaceVision 2010

Back in November, the University of Illinois at Urbana-Champaign SEDS Chapter held SpaceVision 2010. SpaceVision is the National Conference of SEDS-USA. It is organized and run 100% by the students of SEDS chapters. Speakers from far and wide in the space industry came to speak, and students (and other attendees alike) came to participate in the exciting goings on. Here's a look back at the organization of SpaceVision 2010 from the voices of those who helped make it happen!

Logistics: Akshita, Nathan and Dayne

The Space Vision 2010 Conference logistics team was responsible for a wide variety of tasks throughout the conference. Some responsibilities included hotel reservations, campus room reservations, banquet planning, transportation planning, schedule and flow coordination, volunteer coordination, and audio and video equipment coordination. Although, the logistics team started out with a single person, it eventually grew to include many more people, each responsible for individual areas of responsibility. Overall, the conference flowed very well, logistically, and was commended by both delegates and speakers. One main reason for the positive result is that planning occurred well in advance. In fact, logistical planning started almost a year in advance. Another key reason is that logistical responsibilities were split amongst a group. Logistically issues are key ingredients that determine the flow of the conference and there are too many different responsibilities to be all dealt by one or two people. Perhaps one thing that could have been beneficial is to run through the flow of the conference, checking for AV equipment and flow issues, with the logistics team and volunteers, a day in advance of the conference.

Above: At the SEDS Banquet, Will Pomerantz gave his inspirational speech about the X-Prize and going for the gold. Image Credit: Andrew Dianetti, UB-SEDS

SpaceVision 2010 began at the University of Illinois at Urbana-Champaign's Levis Faculty Center with Alan Ladwig from NASA. It continued with various speakers from multiple leading aerospace companies including Lockheed Martin, SpaceX, Northrop Grumman, Jacobs, and many more. In addition to the conventional speeches, there were also campus tours, social events, a banquet, a State of the Industry exhibition, and even a caricature booth by SpaceWiki. The conference concluded with the SEDS Council of Chapters, elections, and a closing speech by Bob Richards via Skype. Overall the conference was a success, both logistically and as a whole.

Publications: Coralie

SpaceVision 2010 was successful from the point of view of publications. Advertising went well with over 50% of the conference attendees from out of state. We were able to come in under budget, on time, and without major mishap. Our pre-conference responsibilities included: design of the conference logo and other related logos: advertising the conference through (1) SEDS NOVA magazine (2) press releases to major and local news organizations (3) contacting universities to spread word to students and (4) creation of flyers to post around campus. Conference responsibilities included the creation of the conference delegate package, conference banners, signage, nametags, and t-shirts.

Looking back, it would have been advantageous to have more than two people on the team. Coordinating with different printing companies can be an organizational headache and spreading the responsibility over three or four people would ease the task load. In addition printing will go a lot smoother if your designs and logos are the correct file format and size. Make sure to ask what file type and resolution whoever is doing your printing wants before you finalize your designs. Along those lines, using a professional printing company helped us immensely. Their expertise helped polish rough parts of our designs, and they were able to work with us to find the right file sizes and types so our publications looked professional.

Corporate Relations: June

As a corporate relations chair of the SpaceVision 2010 committee, my responsibility is to search for funding from companies or organizations to sponsor the conference. The committee began our weekly meeting right after winter break, which was a very great plan because seeking for sponsorship definitely takes time. Searching for sponsors went well in most parts, however, there are many things that we could have done better. Having a strong committed team is very important because once you divided the contact list of companies among each team member, it is better to have one person take care of the communication between them and the company they contacted to avoid confusion and miscommunication. Advice for future SpaceVision: Make a list of companies in this industry and contact them early and make sure are able to give them all the benefits they should receive as agreed. See you next year!

SEDS Relations: Ajoy

In my opinion, SpaceVision 2010 at the University of Illinois was a fantastic conference overall. At times we did have obstacles, be it the sponsorships or logistics, or random difficulties that just arose in the conference. Yet these were in the end mostly overcome. Students had the opportunity of meeting space enthusiasts and many new faces from all over the United States. It was a pleasant experience for me to understand the perspective of others on space development yet at the same time a good opportunity to get to know people in person. It was my privilege to work with both a dedicated conference chair and committee, past conference chairs and the SEDS-USA executive board.

Speakers: Greg

The speaker relations group contacted and organized the speakers for the conference, from reaching out to them months in advance, to making sure their accommodations were taken care of at the conference. A big recommendation is to stay in contact with any speakers who agree to attend more than 3 months in advance, to keep them updated and so the conference stays fresh in their minds. Stay organized! An online document is helpful for storing information, as everyone on the committee has access to the information in it, and it provides some incentive to get through various phases of organization on time. Make sure to keep the document updated, and don't underestimate how long it will take to get through one phase of planning (contacting speakers, obtaining biographies/abstracts, organizing transportation), or be prepared to send out scores of emails early in the morning. If everything is organized properly, having more than one person working on organizing speakers would be very helpful, considering how many phone calls/emails need to be made.

Above: Introducing the new SEDS-USA Executive Board for 2010-2011. Left to right: Hallie Gengl (Expansion), Dina Cavicchia (Educational Outreach), Sara Meschberger (Vice Chair), Dan Pastuf (Chapter Affairs), Rick Hanton (Chair), David Holewka (Publications), and Chris Ogden (Finance). (Not pictured: David DeBoth, Josh Sosa, Zach Liquorman, Mike Lotto, and Anna Ho). Image Credit: Andrew Dianetti, UB-SEDS

The SpaceVision 2010 Awards

Every year, there are several awards handed out to SEDS Chapters and individual SEDS members. Here are some words from a few of this year's winners.

SEDS Chapter of the Year: UB-SEDS

UB-SEDS was awarded the 2010 SEDS Chapter of the Year award on November 6, 2010, at the SpaceVision conference.

The University at Buffalo chapter of SEDS was formed in 2006. Since then, the chapter has grown substantially and now partakes in many different projects and activities. The mission of UB-SEDS is to raise interest and awareness of space exploration and development, by connecting students of all disciplines with space projects, industries, and careers.

UB-SEDS has an active rocketry project group. This group is focused around designing, building, and launching high-powered rockets. This group has grown substantially in the past year, with members now achieving NAR certification and launching larger rockets. This group also has projects in propulsion development, and is in the final stages of building a flight computer.

The astronomy project group holds frequent observing nights to view the night skies through a club telescope. These events are popular with both club members and other students, frequently attracting large crowds. Members also travel to dark-sky locations to escape the light pollution of the suburban campus, where observation is vastly improved. This group is also working to replace an old student observatory on our campus. Proposals have been studied for new observatories, and the group is currently seeking funding for the facility.

UB-SEDS has an educational outreach group that is dedicated to promoting academic excellence in youth by teaching and inspiring about space and related topics. Members travel each week to the Buffalo Museum of Science to conduct activities and demonstrations about space exploration and astronomy. This group also has held programs at public elementary schools.

The UB-SEDS Nanosat team develops proposals for a nanosatellite to submit to the US Air Force's University Nanosat Program. This group submitted proposals in 2008 and 2010.

The club's newest project group is designing a payload that will photograph the earth and take data from the upper atmosphere aboard a high-altitude weather balloon. This group is hoping for its inaugural launch in the spring or summer of 2011.

UB-SEDS also holds many events throughout the year. In March 2010, the chapter was host to the Northeast Conference of Space (NECOS), a SEDS regional conference. Each year, the chapter hosts a Yuri's Night Party. Plans are currently in work for a large party in 2011 to celebrate the 50th anniversary of manned spaceflight.

UB-SEDS could not enjoy its success without the dedication of its many members. The chapter is excited to continue its activities, and to contribute to the SEDS organization. New ideas and opportunities are always welcomed. More information can be found on the chapter website, www.ubseds.org.

-Andrew Dianetti, President, UB-SEDS

The SpaceVision 2010 Awards

Best New SEDS Chapter: UW SEDS

This year the University of Wisconsin – Madison started a SEDS chapter to join with our current AIAA chapter. We number about 20 students, all very passionate about space. Some of the projects we have going on include: rocket launch teams, microgravity teams, and a team designing an inflatable habitat for the NASA Academic Innovation Challenge. We were able to bring seven of our members to SEDS Spacevision this year, and won the Best New Chapter Award. We look forward to continued involvement and the community that SEDS brings!

Project of the Year: We Want Our Future

The We Want Our Future initiative, winner of the 2010 Project of the Year award, is a grass-roots educational outreach initiative. Started by students from the University of Colorado SEDS (CU-SEDS), the initiative aims to inspire elementary school-aged students using space exploration. Freely available outreach materials include an inspirational video, annotated exploration-based presentation, letter from an astronaut, and postcard program. The initiative is making an impact nation-wide by combining art and creativity with science and technology. We Want Our Future has received participant submissions from 20 states and is continuing to accept dreams from participants around the globe!

Help us to inspire the next generation of SEDS members! For more information about how you can help, visit www.WeWantOurFuture.org!

The SpaceVision 2010 Awards

SEDS Video Advertisement Competition:

I have been fascinated with space ever since I started listening to David Bowie when I was 10. We were living in England, and my father had moved to the Arizona to secure a house and job, while my mother, my two siblings, and myself had stayed behind for a year to finish up school before moving out there to join him. I found myself sinking deeper and deeper into depression the longer my dad was away and the more it rained. One day, after rummaging through my dads CD collection, I found a David Bowie CD. I would sit in my room alone, turn on that CD and let his music take me away from my lonely and depressing life. Most of his songs are space themed, and listening to them would open up my mind and take my imagination billions of light-years away to new worlds and planetary systems. That's probably why these days you can always catch me staring up at the sky. So when my friend Jim, a member of SEDS, told me about a video competition for their organization, I was rather enthusiastic about it.

I had to think of a way to capture the beauty of space without a big budget or a spaceship. I ended up buying an intervalometer for my camera, which allows me to set up my camera to take a picture every twenty seconds or so. Using this setup, I would program my camera to take hundreds of 15-30 second exposures of the sky. After a few hours I would stop the camera, take it home, and string all of those pictures together to create one sequence. This technique is known as time-lapse, and can be used to capture slow movement in subjects such as stars and clouds.

Over the next month, my friends Kyle, Jon, and Zach would come with me to various different locations we had discovered around Arizona and do time-lapses. We would drive around late at night until we discovered a good spot, then I would set up the time-lapse and we would sit and talk about space for hours while the camera clicked away at the stars. We would try to get more and more creative with our time-lapse locations, sometimes pushing the limits of legality. We did a time-lapse from the top of a hill at the end of a runway to capture planes flying right over our heads, and we climbed to the top of a mountain in the middle of the night just to get a good shot of Jupiter over Phoenix. Some shots would take an hour to film, and others would take five hours, but as the sun started to rise we would all feel a sense of accomplishment. We got the shot.

In doing our time-lapse adventures, I wanted to prove that we could win the video competition through passion, creativity, and determination... and have a hell of a good time while doing it. We filmed the movie late at night and through the early hours of the morning, not only because we were determined, but also because we all enjoyed each other's company and we loved looking up at that ocean of stars. I used the song "Space Oddity" by David Bowie to try and recapture that magic of space that I felt when I was a child, and I definitely think I rediscovered that feeling during the making of this film.

Since I won the video competition, I haven't stopped doing time-lapses. I may not stay out until 5am anymore, but I will take any chance I have to setup my camera below the stars with my friends. There is such a deep and dark mystery that surrounds the ocean of stars and planets that we call space, and for me time-lapses are a way to capture that.

- Freddie Paull, ASU SEDS

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SEDS Alumni Spotlight

Name:	James Pura
SEDS Branches:	University of California, San Diego
Degree:	B.S. Mechanical Engineering

Are you currently going to graduate school or employed? If so, what are you doing, where?

I currently work at NASA JPL in Pasadena, CA as a structural analyst. Currently, I'm working on Mars Science Laboratory, the new mini-cooper-sized rover that we'll be launching next Fall.

Out of all the *annual* space conferences or events you have attended, which one would you suggest the most to current SEDS members? Why?

I would recommend Space Frontier Foundation's NewSpace Conference, because it is the only conference that focuses on commercial space. When I started going to conferences, I quickly learned that there's people that get together to talk about space, and there's people that DO stuff in space. The Space Frontier Foundation is that kind of group.

In what ways did your involvement with SEDS help you follow your dreams?

I owe it all to SEDS. I met Darrell Cain and Josh Nelson at my first-ever conference, and they helped me form my own chapter of SEDS at my school. It was through them that I also became involved with Space Frontier Foundation, and the rest is history.

What is one fun/crazy/memorable SEDS event or memory which you will always remember?

I recall a basement party that was hosted by the MIT SEDS chapter during SpaceVision 2007, and a certain number of VIP's that were hanging out with us. Man, those MIT boys put together a great networking event. Regardless, it was an amazing night full of lively discussions about the future of space, and it's where I met a lot of really good friends, who I still hang out with.

What advice can you offer to SEDS members in their trials during college from your own experiences?

Homework blows. Space is awesome. Get through college and the world is yours for the taking.

Know an outstanding SEDS Alumni from your chapter who is currently involved in the Space Industry? E-mail publications@seds.org to suggest next issue's

SEDS Alumni Spotlight

Yuri's Night and SEDS Prepare to Celebrate 50 Years of Space Exploration

By: *Rob Shannon*

It is, at once, a mix of education and entertainment, an electrifying blend of rocket science and loud music. It's a nod to the past and a toast to the future. It is one giant leap for the continued awareness of space exploration--and one fantastic reason to celebrate.

It's Yuri's Night, the World Space Party, and it's gearing up at clubs, museums and SEDS chapters worldwide for the 50th anniversary of one of humankind's greatest technological achievements: The first human spaceflight by Soviet Cosmonaut Yuri Gagarin on April 12, 1961.

"When I think of how Yuri's Night has grown and all the wonderful, creative parties that happen all around the globe, it just amazes me," said Loretta Hidalgo Whitesides, who, along with her husband George Whitesides, created Yuri's Night in 2000 at the annual conference of the United Nations' Space Generation Advisory Council.

2011 is set to be the biggest year of space celebration ever, and Yuri's Night would like every SEDS chapter to be a part of it. First celebrated on April 12, 2001, with 64 parties in 28 countries, by 2010 YN had grown to 222 parties in 67 countries. The goal for the 50th anniversary: 1,000 parties worldwide.

Celebrated each year on or around the anniversary of Gagarin's flight, Yuri's Night events take on many shapes and sizes. Planetariums host educational events that draw the likes of Ray Bradbury and George Takei as guests; colleges and universities host all-night dances, rocket exhibitions and movie showings; and groups of friends get together in backyards and bars to talk about just how awesome space really is. Last year, the Yuri's Night flagship event at the NASA Ames Research Center drew over 12,000 attendees, with appearances by private astronaut Richard Garriott and rapper Common.

Yuri's Night is for anyone, anywhere.

"It's always so much fun to see what people come up with each year," Hidalgo said. "We've had raves, we've had costume parties, barbecues, you name it. Yuri's Night is all-inclusive."

Yuri's Night and SEDS have always had a strong relationship, and this bond is bound to only grow in 2011. SEDS chapters at Buffalo, Colorado, Michigan, UNC, and elsewhere have hosted Yuri's Night events that drew hundreds of college students and local space enthusiasts alike. Furthermore, many SEDS members and alumni have gone on to help run Yuri's Night at the global level; YN Executive Director Ryan Kobrick and Assistant Director Brice Russ, among others, were SEDS members when they first got involved in Yuri's Night.

Above: A crowd gathers to celebrate Yuri's Night at the 2010 SEDS UC-Boulder event! Image Credit: James Thomas

"You probably hear all the time about the NASA Center events that draw 5,000 people, but don't be intimidated and think that you have host some humongous party your first year," Russ said. "If you're celebrating space, whether it's with your whole college campus, your SEDS chapter, or just a few friends--that's a Yuri's Night party. Having fun and promoting space are the important things."

Although April 12 is still a few months away, SEDS chapters are already starting to make plans for the big day, so make sure to start thinking up some ideas of your own if you want your chapter to host a Yuri's Night event. To register your (free) event or learn more about Yuri's Night, visit www.yurisnight.net or contact Yuri's Night SEDS Liaison Grant Atkinson at vonbraunguy@yurisnight.net.

Rock The Planet!

Year in Review 2010

by: Matt Cannella

By any measure it is easy to see that 2010 was a busy year for space. Many have stated that this year was a "game-changer" for both private and government space entities, one that will be remembered years from now. We at the NOVA have that same belief. Below, we have selected our top 5 influential space events of 2010 (in no particular order). Disagree? Let us know by taking our online poll at http://seds.org/news/nova/nova-expanded/

1. Obama's New Space Policy:

Love it or hate it, President Obama's interest in NASA and our Nation's space policies represent the most presidential interest in space since Kennedy's moon challenge.

2. Free Spirit!

When the Mars Exploration Rover-A, also known as Spirit, got stuck in 2009, it started a national phenomenon. In 2010, however, Spirit was redefined as a stationary research platform, and began anew.

3.

Image Credit: SpaceX

Falcon 9 flights 1 and 2:

It's impossible to deny that 2010 was the year of the Falcon. With 2 successful flights, and the first re-entry of a commercial space capsule, SpaceX has proven the potential of it's Falcon 9 launch vehicle.

Discovery of Gliese 581 C:

For the first time ever, astronomers were able to find a new planet that resided within the "habitable-zone", a measure of distance away from the planet's parent star.

4.

5.

Test flights begin for SpaceShipTwo

Image property of Space.com

2010 saw the first glide tests of Virgin Galactic's Space-ShipTwo craft, which aims to be the first suborbital commercial space-craft. The testing will continue through 2011, and Virgin Galactic aims to have its first customers fly in 2012.

Background Image Credit: NASA

Back to Boston: Redesigns

By Angela Marie Latona

This article is the third of a three-part series that will follow Ben Corbin (MIT graduate student) on his journey toward programming and launching a rocket into the thermosphere to capture atmospheric data ofVenus.

Moving is always difficult. Moving an entire rocket lab –– well, that's an entirely different kind of difficult.

Since completing the testing necessary on the 5th floor of the BU College of Arts and Sciences, Massachusetts Institute of Technology graduate student Ben Corbin has begun the much less academic task of hauling mirrors, gratings and other telescope pieces down to the basement lab of the Boston University classroom building.

Hauling pieces, and cleaning.

"The place is a mess," he said.

After that, it's time to work on design changes, Corbin said. His "immediate focus" is the redesigning of the electrical harness interface plate and preparing new harnesses.

The electrical harness interface plate connects the rocket's payload to another piece that belongs to the Wallops crew.

The reason for the redesign of the interface plate is that the old connectors are not manufactured much anymore (and therefore expensive to find), and they are also heavy and difficult to rewire -- the new connectors are standard pieces, have less mass and are easier to install.

"We also have our new detector systems coming in very soon."

For the rocket team, all new equipment is both daunting and exciting. It requires more testing, but also means the project is coming together and will soon be ready for launch. For Corbin, redesigning and wiring are not the only big parts of his next few months.

"I'm going to test our spare vacuum valves and high-voltage power supplies. We'll send the valves to the people making our detectors so they can attach it to the detector housing, preventing any contamination of the microchannel plates," he explained. "They will also send the charge amps and time-to-digital converters, boxes that will replace similar systems that worked on the old detectors."

A time-to-digital converter (TDC) is a device that measures the timing of incoming data pulses and translates those pulses into real-time measurements.

Not all of these new pieces, however, are brand new.

"Since none of the new boxes will be exactly the same size as the old ones, we can't put everything back in exactly the same place with the bolt holes that already exist," he said. "That's also why we struggle to use the exact same products in this flight as we had in previous flights, even if some of those products are no longer manufactured."

Corbin explained that some pieces of equipment, such as the high-voltage power supplies and the vacuum valves will likely be refurbished pieces, since the company that made them no longer manufactures those exact parts.

"The newer models of these parts may not fit into our payload."

Mounting equipment pieces that don't perfectly fit together will become the final puzzle for the Venus Spectral Rocket team. It is a problem that they need a computer-aided design to figure out -- but a computer-aided design (CAD) does not exist for the current design of the rocket.

Corbin explained that building his own CAD would necessitate disassembling the payload completely, something that might not be worth it in the end. He said a CAD "could be used to optimize the design and check for vibration modes," but explained that those tests would be done at Wallops anyway.

The Wallops testing, called integration testing, would hopefully be completed by June, Corbin said. That would make the launch date late July or early August.

However, NASA Sounding Rocket Operations Contract (NSROC) engineers have a "tight schedule," Corbin explained, and the

launch could get delayed to as late as December 2011.

A Change in Date

Deadlines come and deadlines go, but launch dates are a lot tougher to come by. For Corbin and BU professor John Clarke, it is exactly this idea that currently worries them about the VeSpR.

After months of designing, building and testing, their White Sands launch date has been pushed back one month (from mid-July to mid-August) due to personnel shortages at the New Mexico missile range, a change in date that could result in VeSpR missing its best-case launch window altogether.

"There's really no hard end-date to the launch window - eventually, conditions just get poorer and poorer as Venus moves lower on the horizon and closer to the Sun every night and the line-of-sight velocity decreases," Corbin said. "We're not sure which one will end the window, the star tracker's ability to find Venus, the detector's acceptable noise rate, or the resolution of our optics to differentiate between the Earth and Venus Lyman-alpha lines."

VeSpR, which is set to take data on Venus' atmosphere, requires that planet's line-of-sight relative velocity to be near a maximum, meaning Venus must be coming toward Earth at a top speed. Additionally, there must be enough relative angular separation between Venus and the Sun above the horizon. If not, Venus will be too close to the Sun from an Earth-bound viewer's perspective and there will be too much brightness, "noise," for the rocket's tracker to find Venus and lock on correctly.

The Goddard Space Flight Center's Wallops Flight Facility supported the Poker Flat Research Range (PFRR) for NASA's Sounding Rocket Campaign. This range is located 20 miles north of Fairbanks, Alaska and is the world's only scientific rocket launching facility owned by a university. Image Credit: NASA

"What's happening is that Venus' Hydrogen and Deuterium Lyman-alpha spectral lines are being blue-shifted by the motion of Venus coming toward Earth," Corbin explained. "This is what separates the Venus Lyman-alpha from the Earth Lyman-alpha. The faster Venus is moving towards us, the greater separation there is between the Venus L-alpha and the Earth Ly-alpha."

Corbin explained that if Venus were in fact moving away from the Earth, the light would become red-shifted and make Venus' already dim Deuterium Lyman-alpha tough to distinguish from Earth's bright Hydrogen Lyman-alpha line.

Looking Back: A Farewell

All projects must eventually come to an end -- this summer VeSpR will hopefully fly for the first and last time under Corbin's watch -- but that does not mean that the memories and stories from working on it will be lost in the stratosphere anytime soon.

"I was warned that the alcohol fumes would cause me to feel hungover," Corbin said, recalling one of his more memorable stories while working on the project. "So I was careful to exit the [vacuum] chamber long before I started feeling any affects from the alcohol."

Corbin, who had been cleaning the inside of the 18-foot vacuum chamber with rubbing alcohol, had no idea how many fumes he had been inhaling until after he crawled out of the enclosure.

"By the time I reached the end of the tank, I still felt fine, so I backed out and stood on my feet. As I stood up, I guess the blood rushing from my head combined with the delayed effects of the alcohol inhalation gave me an instant hangover. I walked out of the lab and slumped by the door for a good 15 minutes, laughing at myself for being drunk at work. Next time, I'll use a gas mask."

Looking back, working on VeSpR has afforded Corbin a number of great stories to tell, but it has also given him the chance to face challenges and gain experiences that he would never have otherwise had. Experiences and lessons learned that he will take with him into the next stage of his academic and professional career.

"Whether we launch in August or are delayed to a point where I won't get to see this payload fly, I've learned so much and conquered a lot of challenges to get where I am today," he said.

Corbin is currently working on his Masters' in aerospace engineering, but working on VeSpR as part of a two-person team has meant expanding his knowlege base and working in areas that are new to him. For example, while working on assembling

hardware for VeSpR, he has had to learn about various aspects of electrical and systems engineering -- disciplines he had only dabbled in prior to starting the project -- and solve problems involving design and systems interactions.

"There is nothing more important to me this summer than making sure this rocket goes off."

There are, however, a few things that are almost as important to him. Among those things are his sister's high school graduation, which Corbin will give a commencement speech at, and his brother's engagement party. He has already secured a few days off for the graduation, but is still uncertain if he will have the time to visit his brother.

"There are a few other interesting conferences I'd like to go to, but again, all of these events combined aren't as important to me as this launch."

However, even with the possibility of launch happening in a short number of months, Corbin is not yet ready to say that things are coming to an end -- and very well he shouldn't, since the months to come will be increasingly hectic.

"Things are going to get busier than ever, and I won't have time to think about how I'll feel when it's all over," he said. "If that means sleeping in the lab throughout June, ignoring friends and family, and getting fat off U-Grill food, so be it...I'd rather stick to the schedule and pace out the work than sacrifice sleep, but again, whatever it takes for the greater good of science!"

For Corbin, the science is not just about collecting data on Venus' atmospheric spectrum -- it's engineering, space flight, human travel -- all aspects of the project that makes VeSpR more of a life passion than "just a job" for him.

"This project combines so many of my interests -- rocket engineering, planetary science, exploration, travel -- that I still haven't been able to come up with a thesis topic for a Ph.D that will top this project," he said.

"The only way to make it better would be if I were being strapped to the rocket, but I'm saving that for future endeavor."

Blast from the Past

A look back at previous versions of the NOVA: Reflection by: Matt Cannella

This Quarter's Blast from the Past comes to us from the January 1997 version of the NOVA:

GO FOR THE GLORY: SEDS regional expansion coordinators needed now!

SEDS-USA is launching a campaign to expand the number of chapters across the U.S. in order to have a greater impact in our outreach efforts. A cornerstone of this effort will be volunteers at the regional level, such as within a few states or even around a single city. SEDS needs these volunteers to encourage prospective chapters to organize themselves to the point they register with SEDS. This effort will directly benefit existing chapters by making regional events more possible and providing additional intramural interaction.

SEDS already has quite a few contacts, so no cold calling would even be necessary, and volunteers will receive extensive assistance from the Director of Expansion and other officers where appropriate. To find out more, please telephone or email Mark Ciotola #(415) 564-

This call for action comes from the 1997 January edition of the NOVA. The late 1990's were a time of re-grouping and re-focusing for SEDS, and expansion was one of the primary goals for SEDS-USA. The work done here, from this NOVA and other publications of that time, laid the groundwork for many of the most successful SEDS chapters today. In contrast, today's SEDS chapters are stronger than ever, and we are still expanding each year. 2010 saw several new chapters, such as VTSEDS at Virginia Tech, and the Colorado School of Mines Space Society.

November 1, 1962—The Soviet Mars 1 probe made the first successful flyby of Mars,.
November 3, 1957—The Soviets launched the first living being from Earth aboard Sputnik 2, a dog named Laika. The dog did not survive the trip.
November 9, 1967—The engines of the enormous Saturn V rocket used to launch all the moon missions were fired up for the first time. The launch registered on geological instruments as far away as New York, and a CBS broadcast booth three miles from the launch pad collapsed.
November 11, 1966—Gemini 12 was launched, the last flight of the two-man series whose many flights yielded information vital to the moon-bound Apollo program.
November 14, 1969—Apollo 12 was launched, the second manned moon landing; Alan Bean and Dick Gordon investigated the moon's surface and "recovered" the unmanned Surveyor 3 probe.
November 16, 1965—The Venera 3 probe launched by the U.S.S.R. became the first man-made object to enter the atmosphere of Venus, though the pressure of the atmosphere crushed the probe before it relayed any data.
November 19, 1996—Space shuttle Columbia lifts off for mission STS-80, the longest U.S. space shuttle mission to date.
November 28, 1964—Mariner 4 was launched; it later returned the first close-up photos of Mars.

December 2nd, 1988—Space Shuttle Atlantis launches, marking the 27th flight of the U.S. Space Shuttle.
December 2nd, 1990—Space Shuttle Columbia lifts off on its 10th flight, carrying Apollo/Soyuz test flight Astronaut Vance Brand.
December 2nd, 1993—Space Shuttle Endeavor is launched en route to repair the Hubble Space Telescope on the 1st service mission after significant defects are found in the main mirror of the Telescope.
December 4th, 1965—Gemini 7 launched, the 1st half of the first experimental rendezvous in space with Gemini 6.
December 4th, 1973—Pioneer 10 makes close approach to Jupiter, the first visit to the Planet by a man made vehicle.
December 5th, 1974—Pioneer 11 makes closest approach to Jupiter. The craft would later go on to Saturn, arriving 5 years later.
December 7th, 1972—Apollo 17 launched, marking the final launch of the Apollo program and the last time (so far) humans have stepped foot on the Moon. Landing astronauts included Gene Cernan and Harrison 'Jack' Schmitt, with Ronald Evans in the command module.
December 8th, 1990,1992— Galileo Space Probe swings past the Earth on its trajectory to Jupiter.
December 15th, 1965—Gemini 6 launched to rendezvous with Gemini 7
December 15th, 1984—Soviet Union launches Vega 1, a probe visiting Halley's Comet during its 1985-1986 visit to the inner solar system
December 16th, 1917—Arthur C. Clarke, prominent author of several science fiction books and one of the chief contributors of the concept of using Geostationary orbit for telecommunications satellites, is born.
December 21st, 1968—Apollo 8 launched, carrying the first group of humans to lunar orbit.
December 30th, 1985—Voyager 2 discovers a small moon of Uranus, later named "Puck". This discovery marks the 1st discovery of a Uranus moon in over 37 years.

January 1, 1801 - Ceres, the largest known asteroid, is discovered. Due to its size, it is originally thought of as another planet in between the orbits of Mars and Jupiter.
January 5th, 1917—Robert Goddard receives $5000.00 grant from the Smithsonian institute to develop rockets to be used to study the upper atmosphere.
January 7th, 1610—Galileo Galilei discovered the four largest moons of Jupiter, Io, Europa, Ganymede, and Callisto with his telescope.
January 9th, 1990—Space Shuttle Columbia is launched on a mission to retrieve the Long Duration Exposure Facility, a small satellite deployed to study the effect of long duration vacuum exposure on materials.
January 12th, 1986—Space Shuttle Columbia launched, including crewmember Congressman Bill Nelson. This will be the last successful shuttle launch for over two years.
January 12th, 1997—Space Shuttle Atlantis is launched on 5th Shuttle mission to the Russian Space Station Mir.
January 13th, 1993—Space Shuttle Endeavor's 3rd flight.
January 14th, 1969—Russians launch 4th and 5th Soyuz missions.
January 20th, 1930—Buzz Aldrin, Apollo 11 lunar module pilot and 2nd person to step foot on the moon is born.
January 24th, 1986—Voyager 2 makes its closest approach with Uranus, the first pass by the planet by a space probe. This pass discovers ten moons, new rings, and an abnormal magnetic field.
January 27th, 1967—Crew of Apollo 1 flight Gus Grissom, Ed White, and Roger Chaffee die in an accidental ground test as a result of a 100% oxygen atmosphere.
January 28th, 1986—Space Shuttle Challenger explodes 73 seconds after liftoff, killing the crew. The cause of the accident is revealed to be a failure of O-rings on the solid rocket boosters, which were unable to seal due to the low temperatures of the day.
January 31st, 1958—Explorer 1 becomes the first American satellite successfully launched. Its mission successfully detected the radiation belts surrounding Earth now known as the Van Allen belts.
January 31st, 1966—Soviet probe Luna 9 becomes the first ever man-made object to soft land on the moon.
January 31st, 1971—Apollo 14 launched to the Fra Mauro craters, the previous target of the most successful failure Apollo 13 mission. Astronaut Allen Shepard is known for playing golf on the moon during this landing, while Astronaut Stuart Roosa brought many seeds onto the mission, what would become known as "Moon Trees" when they were grown back on Earth.

SEDS Legislative Update

Council of Chapters Summary:

September 25th, 2010

- Discussion of Chapter Updates: ASU, UB, CUSEDS, Caltech, UCLA, GW, UA, UMich, CSM, UM, Florida Tech, ASU, Iowa State, and UW had brief summaries of activities
- Updates regarding Space Vision 2010 planning
- Executive Board updates, including SEDS Video Ad Contest, SpaceVision 2011, and elections
- Brief discussion of public outreach initiative, www.WeWantOurFuture.org

November 7th, 2010

- Discussion of elections at SpaceVision 2010
- Update regarding SEDS political advocacy
- State of SEDS by the numbers

December 1st, 2010

- Discussion of Chapter updates, UKentucky, DSS, UCF, UA, GW, CSM, Florida Tech, Illinois, SLU, Purdue, Iowa State, UCLA, MIT, CU, and RPI had brief summaries of activities
- Executive Board updates, including SEDS Writing Contest and Endowment
- Motion Carries 16-0-0: SEDS Space Advocacy: Tabled discussion of political advocacy

Executive Board Summary:

- Prior to SpaceVision 2010, Rick Hanton was temporarily appointed as Treasurer
- Discussion of the Endowment, http://seds.org/involvement/endowment-fund/
- Discussion and brainstorming of additional national projects, which will be along the same lines as Rockoon
- Reminder of online networking, including http://twitter.com/sedsusa/seds and http://www.facebook.com/sedsusa
- Establishment of the SEDS Holiday Competition, http://chapters.seds.org/holidaycompetition/
- Discussion of improvements to http://seds.org, including new layouts
- Discussion of advantages and disadvantages of current administrative tools
- Motion Carries 9-0-1: Christopher Ogden is the primary signatory of the Bank of America SEDS-USA accounts while the Chair of SEDS is the back up signatory
- Motion Failes 3-3-1: Spending freeze until Executive Board assesses 2010 spending

A complete summary of the activities this quarter activity is available at:
http://wiki.seds.org/index.php/SEDS-USA_Meetings, send questions/comments to secretary@seds.org

SEDS-USA Board

Meet the new SEDS-USA Executive Board. These are the people the SEDS Chapters have voted into position at SpaceVision 2010 to lead SEDS nationally and continue and expand the national organization.

Chair: Rick Hanton, ISSS-SEDS

My name is Rick Hanton and I am the new chair of the SEDS-USA executive board for 2010-2011. I study Computer Engineering at Iowa State University and have been part of the Iowa State Space Society SEDS chapter for 4 years now. As chairman of SEDS-USA, there are many things I would like to see the board accomplish in the next year such as the creation of even better connections between individual SEDS chapters and SEDS-USA, work to partner closely with multiple outside organizations, and I would like to see the SEDS endowment make substantial progress towards providing yearly returns for the organization. Please contact me if there is anything you'd like to see the national organization pursue or if you simply want to discuss the future of SEDS!

Vice Chair: Sara Meschberger, UA SEDS

Hello my name is Sara Meschberger and I am the new Vice-Chair of SEDS-USA. I am a junior at the University of Arizona double majoring in Communications and Linguistics. As Vice-Chair my goals for this year are to continue work on the endowment by reaching out to donors and finding new potential donors, raise awareness for conferences and to support Rick Hanton and the rest of the board in any way I can to make this year the best year SEDS has ever seen.

Director of Chapter Affairs: Dan Pastuf, UB-SEDS

My name is Dan Pastuf. I am currently (as of Dec. 2010) a student at the University at Buffalo, studying Aerospace and Mechanical Engineering. My design interests include controls and micro-controller development, as well as propulsion development.
I have been active in Students for the Exploration and Development of Space sense 2007, and was elected President of the Buffalo chapter at the end of my Freshman year. I remained President until Spring 2010, where I stepped down to purse other tasks. I was elected Engineering Club Coordinator for 2010-2011.

Director of Chapter Expansion: Hallie Gengl, ASU SEDS

I am a Junior at Arizona State University, majoring in Earth and Space Exploration with a concentration in systems design. I have been a research intern at Lunar Reconnaisance Orbiter Camera (LROC) on the ASU Tempe campus for the past two years. After co-founding SEDS-ASU last January, I'm thrilled to have the opportunity to hold a executive board position. This year I hope to expand SEDS more on the west coast and increase number of chapters nationwide.

Director of Finance: Christopher Ogden, UB-SEDS

I'm a senior Finance major at the University at Buffalo. I have been involved in SEDS for three years, and I'm looking forward to furthering the goals of SEDS this year.

Director of Publications: David Holewka, UB-SEDS

Hello, my name is David Holewka. I 'm a double major in Mechanical and Aerospace Engineering at the University at Buffalo, where I am the Vice President of UB-SEDS. As Director of Publications, it is my job to bring you the NOVA and manage any other publications SEDS-USA decides to release. I try to use this position as a source of revenue for SEDS-USA and help to expand the public knowledge about space and SEDS through the NOVA.

Director of National Projects: David DeBoth, FIT-SEDS

Hi, I'm David DeBoth of Florida Institute of Technology SEDS, and I'm serving on the executive board as the Director of National Projects. In the upcoming term, I hope to introduce a number of technical and non-technical projects for SEDS, providing a broad spectrum of ways for our members to develop skills and assist first-hand in the development of space. I also plan on continuing SEDS-USA's work with our affiliate organizations, to further strengthen our bonds.

Webmaster: Josh Sosa, UA SEDS

My name is Joshua Sosa and I am a member of UASEDS. I am the SEDS national webmaster for three years running, in which I oversee all aspects of SEDS web functions and services. For my current term, my goal is to continue to develop the main website into a solid platform that will envelop the SEDS experience for members and visitors to enjoy alike. I am always working to make the site better acquainted with with the SEDS themes and goals through the use of free and open-source software and technology coupled with custom solutions for a variety of situations.

Director of Public Outreach: Zach Liquorman, UB-SEDS

My name is Zachary Liquorman, I am a member of the SEDS chapter at the University at Buffalo. I sit on the SEDS-USA board as the Director of Public Relations. As the 2010-2011 Director of Public Relations my biggest goal is to get as many people to know what the SEDS organization is via the expansion of our social media presence as possible.

Secretary: Mike Lotto, UC-SEDS

Mike Lotto studies at the University of Colorado at Boulder and is a sophomore in Aerospace Engineering. He is excited to work as Secretary and hopes to streamline and improve the process of recording Executive Board meetings. He will also look to assist in any other management duties.

Director of Educational Outreach: Dina Cavicchia, SEDS-UCF

Dina Cavicchia is a senior at the University of Central Florida, majoring in Physics Education. She is currently teaching middle school science and serving as Director of External Affairs for SEDS-UCF. As Director of Education Outreach for SEDS-USA, Dina hopes to spread space awareness through outreach activities. She is currently working on creating a database of outreach materials for chapters to use and a calendar of national events for school-aged students interested in space. She looks forward to igniting passion about space through SEDS!

Director of High School Affairs: Anna Ho, MIT-SEDS

Anna Ho is a freshman at MIT, planning to major in Physics and/or Brain & Cognitive Science. She currently lives in London, and moved there from Singapore when she was nine. She will always be curious about space, and is determined to show the public why exploring it is important to their daily lives. Educational outreach has always been important to her, and she will work hard to get high school students invested in rocketry and the space industry. Her other interests include traveling, playing the piano and the trumpet, Manchester United, and watching Disney movies.

SEDS GALLERY

Above: A Panoramic picture taken day two of SpaceVision 2010 of most of the attending SEDS body. This picture was taken after Gwen Shotwell, President of SpaceX, gave a talk about the growing company. She is featured in the photo, as well as some other prominent members of the space industry.

Want to see your chapter's pictures featured here? Take pictures of your events and upload them to the SEDS Gallery!

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nova

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- Angela Latona, BU-SEDS
- Mike Lotto, SEDS-USA Secretary

Guest Contributors:

- James Pura, NASA Jet Propulsion Laboratory

SEDS Mission Statement:

SEDS, or Students for the Exploration and Development of Space, is an independent, student-based organization which promotes the exploration and development of space. SEDS pursues this mission by educating people about the benefits of space, by supporting a network of interested students, by providing an opportunity for members to develop their leadership skills, and inspiring people through our involvement in space-related projects. SEDS believes in a space-faring civilization and that focusing the enthusiasm of young people is the key to our future in space.

History of SEDS:

Students for the Exploration and Development of Space was founded in 1980 at MIT and Princeton and consists of an international group of high school, undergraduate, and graduate students from a diverse range of educational backgrounds who are working to promote space as a whole. SEDS is a chapter based organization with chapters throughout the United States, Canada, United Kingdom, Asia, Latin America, and the Middle East. The permanent National Headquarters for SEDS-USA resides at MIT. Each chapter is fairly independent and coordinates activities and projects in its own area.

What do SEDS members do?

SEDS members are people interested in doing as much as they can to promote space exploration and development. The first step in this continual process is learning. SEDS provides an excellent environment in which to obtain access to many sources of information including speakers, tours, films, discussion groups & daily NASA updates. Astronomical observing trips and tours of local space facilities also play a significant role in the life of many SEDS members.

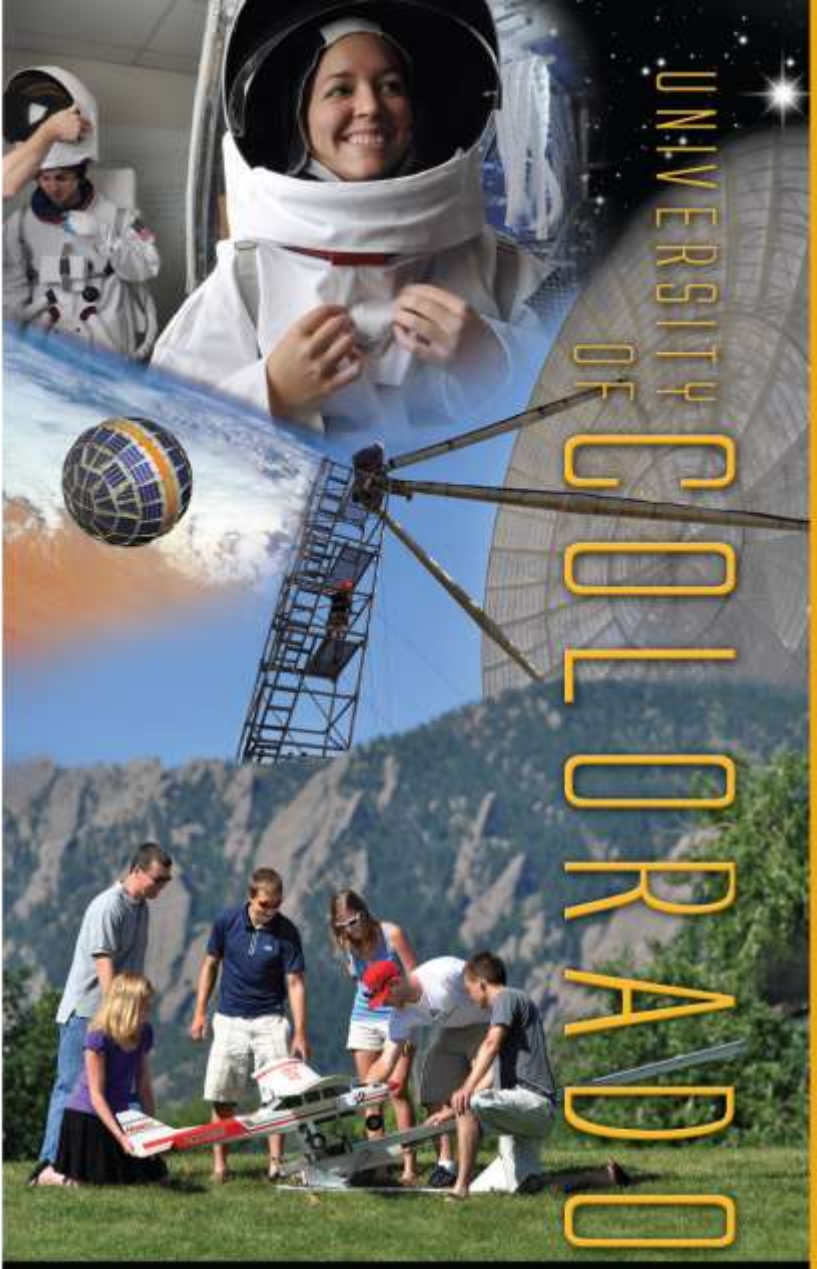
SEDS members often take the knowledge they have gained and use it to influence the future of the space program. Students at several chapters have played major roles in organizing large conferences and have established important contacts with members of the space community. Others have helped increase public awareness of the benefits of space exploration by offering presentations to local primary and secondary schools as well as universities. All chapters keep in contact with each other through on-line computer networks.

Finally, SEDS provides an environment in which people of common interests can relax and freely discuss issues important to them.

What can SEDS do for you?

SEDS can provide an organized pathway for you to begin space related projects and give you a chance to break away from the usual class work. You can also use SEDS as a stepping stone to a space-related career. Being actively involved in SEDS can put you in touch with many members of the space, technology, and education community and will allow you to develop the experience necessary to take leadership roles in your future career, whatever that may be.

For more information on SEDS, or to join/start a new chapter, go to www.seds.org.



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