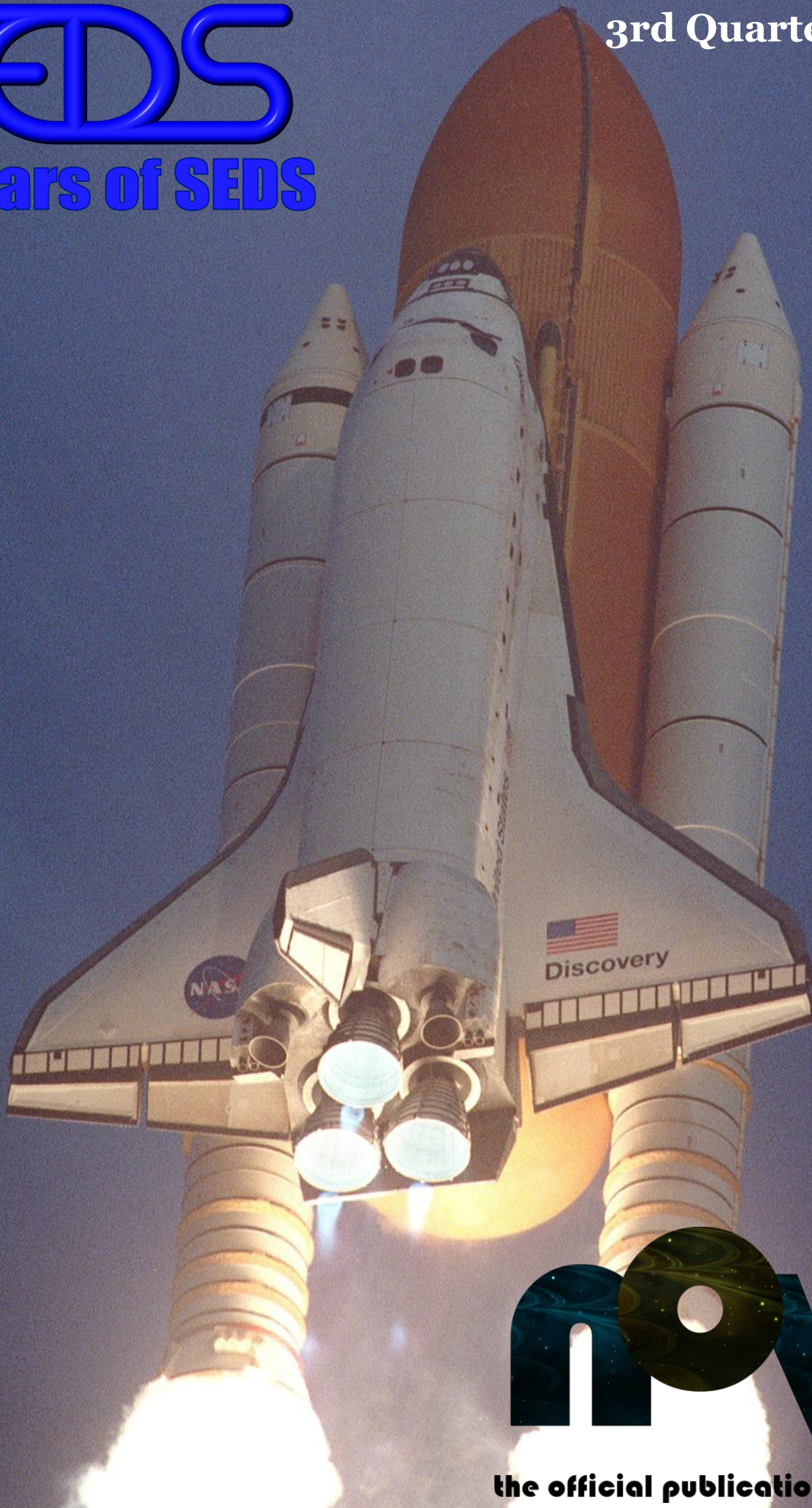


SEDS

30 Years of SEDS

3rd Quarter 2010



nova

the official publication of SEDS-US&A

SEDS

Front Page: Space Shuttle Discovery soaring high into the sky on its way out to the great beyond! Discovery is set to launch on its targeted date of November 1st to travel to the ISS. Image credit: NASA

Above: The Hubble Space Telescope Ultra Deep Field. This image captures galaxies hundreds of thousands of light-years away, causing these galaxies to be viewed as they were billions of years ago. Image Credit: NASA



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SEDS members, alumni, and friends,

Welcome back to another semester of SEDS! Over the past several months I've been following many SEDS students during their summer adventures. Many members took advantage of summer programs such as NASA Academy, International Space University, and more. Even more SEDS students found prestigious space internships across the country. As you settle back into your academic mindset, keep in touch with those friends and contacts you've made over the summer. Space is small, and you will be running into them again!

The beginning of the fall semester is the most important time of year for any student organization. It is the time to recruit new members, plan your semester activities, and get the year off to a great start. If you've never served in a leadership role in your SEDS chapter, now's your chance. Be it leading a pumpkin carving contest or a small satellite project, there are plenty of opportunities for you to get involved.

While it may seem a way off, keep in mind our National Conference coming up in November! Now is the time to start applying for funding and planning your chapter's trip. SpaceVision 2010 is centrally located at the University of Illinois, making it one of the most economical space conferences to attend this year. And with a speaker lineup including the Deputy Administrator of NASA, President of SpaceX, and Administrator of NASA Ames, it is a very valuable experience for your education.

Can't afford to fly? No problem! SEDS chapters have a long history of 'road-tripping' to SpaceVision. Splitting the gas and hotel expenses between 4 - 15 of your chapter's members is a great way to get to the conference on a student budget.

However you manage it, GET INVOLVED. You will only get out of SEDS what you put into it. If you're actively involved in chapter activities, trips, and projects, you'll have lots of skills and contacts to make a powerful entry into the work force upon graduation.

Clear skies,

Joshua V. Nelson
Chairman, SEDS-USA

P.S. Looking for something to do for next summer? Apply to the International Space University summer program! Next year's program is in Graz, Austria. More information on page 8.



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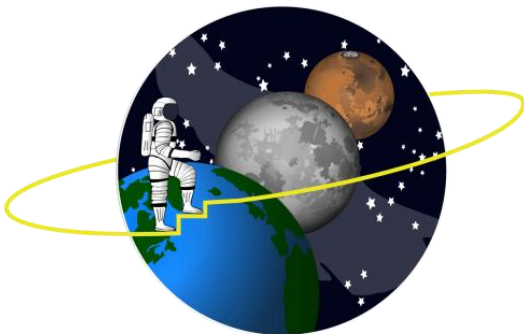
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SEDS Invites You to SpaceVision 2010

The Illinois Space Society (UIUC-SEDS) has been working diligently all year to bring you an awesome SpaceVision 2010 conference. We are excited to announce a great list of speakers, sponsors, and conference events! From November 5th to 7th, 2010, we invite you to join hundreds of students and professionals with a passion for space and space technology at the University of Illinois at Urbana-Champaign. Speeches and discussions will focus around the theme “Envision. Ignite. Achieve.”, which is directed toward the current rekindling of space enterprises. Conference events include: speeches and panel discussions led by experts in the space industry, a student design competition, a State of the Industry Exhibition, the yearly SEDS executive board elections, sponsored lunch, a classy banquet, campus and facility tours, and much more.



SpaceVision 2010 has an exciting list of speakers, featuring: Pete Worden, Director of NASA Ames; Lori Garver, Deputy Administrator of NASA; Steve Brody, Vice President of International Space University; Bob Richards, CEO of Odyssey Moon and co-founder of SEDS and ISU; Gwynne Shotwell, President of SpaceX, and many more. For a complete list of speakers, visit our website.

The student design competition will focus on creating a sustainable profit-making company for providing cargo transportation to the moon. The competition, sponsored by Odyssey Space Research, is an interdisciplinary project that mirrors the Google Lunar X-PRIZE competition.

Our State of the Industry Exhibition will provide students with a great opportunity to meet and network with representatives from major companies in the aerospace industry. The exhibition will be organized like a fair, where conference delegates can walk around and learn more about how each company is active in the current state of the industry.

Conference delegates will also enjoy a complimentary lunch sponsored by the International Space University, as well as snack and coffee breaks throughout the weekend. Additionally, delegates have the option to participate in our Banquet dinner hosted at Stone Creek golf course on Saturday night. This event will feature a speaker and a delicious full-course meal.

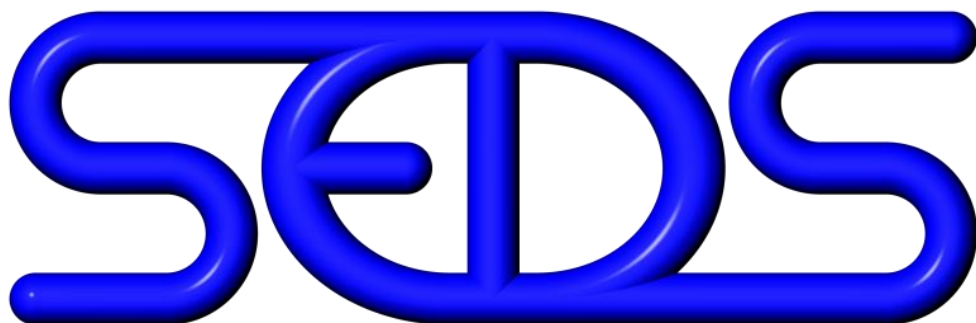
During the conference, delegates will have the opportunity to take advantage of some of the great resources available at the University of Illinois. Tours of our world renowned engineering facilities, including: CubeSat program, Electric Propulsion lab, wind tunnels, historical observatory, and the Autonomous Materials Lab (to name a few) all focus on new, cutting edge technology for space.

SEDS SpaceVision 2010 wouldn't be possible without our sponsors. Northrop Grumman, our 'Jupiter' level sponsor, is a premier provider to the space industry. From systems engineering to spacecraft manufacturing to ground stations development and space instrument design, Northrop Grumman transforms lofty concepts into high-flying reality for a wide variety of missions. Our other sponsors include: Lockheed Martin, International Space University, Odyssey Space Research, Space Frontier Foundation, the Boeing Company, the University Of Illinois Department Of Aerospace Engineering, and the Illinois Space Grant Consortium.

With all of our speakers and events, as well as nationally renowned professors and a good network of corporate affiliates, we feel as though attending this conference at the University of Illinois would be a fantastic opportunity for any space enthusiast. Please visit www.spacevision.seds.org for more information and to register today! We look forward to seeing you in November!

-Coralie Jackman

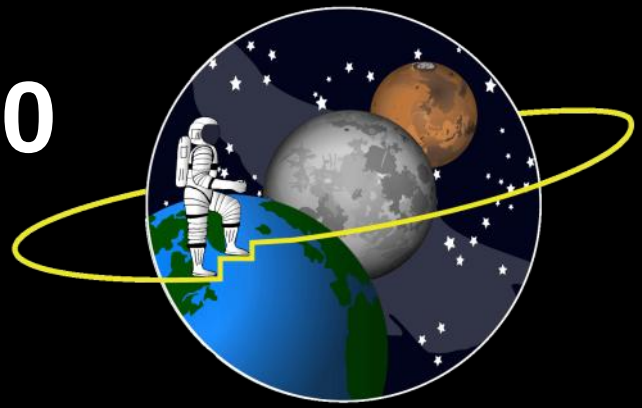
Director, Illinois Space Society (UIUC-SEDS)



SpaceVision 2010

Envision. Ignite. Achieve.

November 5-7, 2010



The Students for the Exploration and Development of Space (SEDS) invite you to attend our annual national conference, SpaceVision!

SpaceVision 2010 events include: speeches and panel discussions led by industry experts, a student design competition sponsored by Odyssey Space Research, a 'State of the Industry' exhibition, the yearly SEDS executive board elections, and much more! Speeches and discussions will focus around the theme "Envision. Ignite. Achieve.", which is directed toward the current rekindling of space enterprises. Current speakers include:

- Pete Worden, Director of NASA Ames Research Center
- Lori Garver, Deputy Administrator of NASA
- Steve Brody, Vice President of International Space University
- Gwynne Shotwell, President, Space Exploration Technologies
- Bob Richards, CEO of Odyssey Moon
- Jeff Feige, CEO of Orbital Outfitters
- Michael Laine, Founder of Liftport Group
- George Nield, Associate Administrator for Commercial Space Transportation, FAA
- Ben Brockert, Armadillo Aerospace
- Michael Burghardt, Boeing
- Colin Ake, Masten Space Systems
- Will Watson, Space Frontier Foundation

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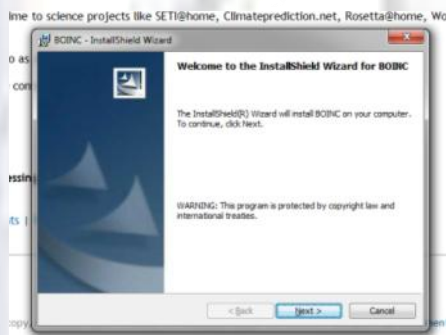


HOW TO:

Install SETI@HOME

One major question that humanity often asks; “Is anyone out there” is something that can be done by the masses thanks to the SETI@Home project. SETI, or Search for Extra-Terrestrial Intelligence is a project trying to search for Alien life in one of the only scientific means possible; listening for them. SETI@Home is the continuation of this. In order to analyze all of the data, it would take significant super-computer time, whereas by using SETI@Home, a distributed computing program, everyone can share in the research to try to discover signals from other worlds.

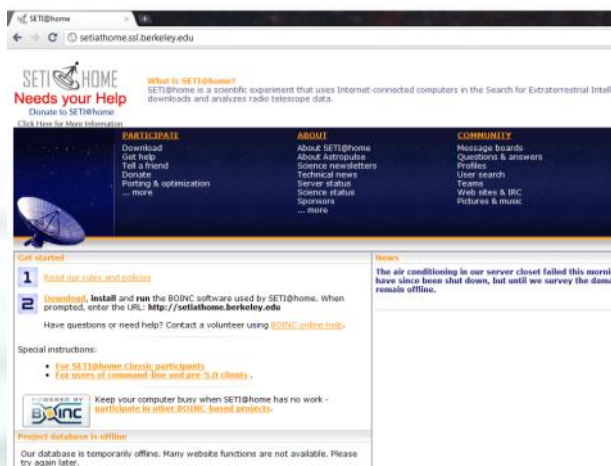
Step 2: Install—Click through the typical InstallShield wizard, installing the program where you desire (typically the C:\ drive).



Participate:

SEDS currently has a team on SETI@Home. Compete against fellow SEDS members around the world to complete the most workunits! You can find and join the SEDS team at http://setiathome.berkeley.edu/team_display.php?teamid=32001

Step 1: Download—Click the download link to download the executable file for BOINC, the software needed to run SETI@Home.



Step 3: Run—After installation is complete, your



window should open like what is shown to the left with the SETI@Home project running. If this is the case, your all set to run the program, although you may need to register an account with the SETI@Home Project in order to begin running workunits. If SETI@Home isn't running when you start, click add project and find SETI@Home in the list of BOINC Projects.

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<-Students listen to VT-SEDS President Brian Keller and Vice President Katie Hall talk about SEDS during their inaugural meeting.

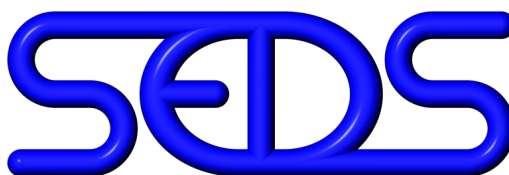
SEDS-USA would like to welcome its newest Chapter: VT-SEDS! The Chapter had its first introductory meeting on August 25th at Virginia Tech. Many students attended, and many more signed up for the club at VT's engineering open house event, at which VT-SEDS was represented. Already the club boasts over 25 members, and has started work on several space design competitions. Best of luck to the SEDS Chapter at Virginia Tech!

YouTube Video Ad Contest!

SEDS-USA has just launched the SEDS YouTube video contest. The premise of the competition is to create an advertisement for SEDS describing what SEDS means to you in 2-5 minutes. The National Space Society and Space Frontier Foundation are partnering with us for the competition by giving prizes such as an International Space Development Conference registration pass and \$200. Judging will be done by the SEDS-USA executive board. For the top ten finalists, judges will include Will Pomerantz, Will Watson and Gary Barnhard. The videos will be viewed and awards will be presented at the SpaceVision 2010 banquet. The contest runs from now until Oct. 22. For more information, go to <http://seds.org/video-ad-contest>.



- Sara Meschberger, SEDS-USA Director of Projects





The International Space University – SEDS Finishing School

Article and photos by Joshua Nelson, Chairman, SEDS-USA

Hopefully by now you've all run across the International Space University during your time in SEDS. ISU was established by the founders of SEDS in as the 'next step' after students interested in space exploration complete their undergraduate education. Every summer the school gathers over 100 participants from over 25 different countries for an intensive 10 week graduate level program.

To promote the most diverse experience and attendance possible, the ISU SSP takes place in a different country every year, ensuring each SSP has a unique composition and environment. This year, SSP was held at the ISU home campus in Strasbourg France.

The program begins with a large opening ceremony where various VIPs from across the space industry try to give the students some perspective on the rollercoaster ride ahead.

Weeks one through three consists of the Core Lectures. These are taught in a traditional classroom setting and cover all of the ISU core departments including:



Members and alumni of SEDS UK, SEDS USA, and SEDS Kuwait gathered at an SSP networking event.

- Space Business Management
- Satellite Applications
- Physical Science
- Life Science
- Space and Society
- Policy and Law
- Space/Systems Engineering

These lectures are designed to give you a basic understanding of the areas of space exploration outside of your area of expertise. This knowledge helps students better choose the Department they want to specialize in for the remainder of the SSP. After the lectures have concluded, there is a comprehensive examination of the material to ensure students retained the lecture material.

Once their core lectures and comprehensive exams are over, students spend the next three weeks of the program in one of the seven ISU departments. Students are encouraged to select a department outside their area of expertise to become truly well rounded space professionals (for example Engineers might take the Social or Life Science departments, where as a Lawyer might sign up for Engineering or Physical Sciences).

Departments use traditional lectures, hands on activities, projects, assignments, and workshops to give students a comprehensive overview of the field in question.

The last three weeks of ISU is reserved for the Team Projects. The objectives of these projects are threefold:

- To encourage students to use their educational and/or professional backgrounds, in addition to knowledge and skills they acquired during the lectures and workshops of ISU.
- To experience decision-making and project management procedures, as well as to learn how to develop solutions and recommendations through working in multidisciplinary and intercultural teams.
- To produce a comprehensive professional report, which the teams then present and defend in a public session. The report covers all aspects of the ISU curriculum including technical, scientific, financial, organizational, political, and legal analysis.

It is almost impossible to comprehend how these Team Projects work, or how much students learn without experiencing it for yourself. The students are divided into teams of 40-50 students to write a 100 page report on an important area in space exploration. Forcing the students to work in such a large, intercultural, interdisciplinary team proves to be a life changing and leadership building experience.

ISU has been a life changing experience for many SEDS members and industry professionals. I would highly encourage everyone who reads this to consider applying for next year! If you've any questions about ISU, email me at: joshua.v.nelson@gmail.com

Next year's SSP will be held in Graz, Austria from July 11th to September 9th 2011.

More information on ISU can be found on the web at: <http://www.isunet.edu>

Information on the AAS scholarship to ISU with preference for SEDS USA members can be found at: <http://astronautical.org/awards/scholarships/>



SEDS UK member Ruth Pearson looks through the historic Univ. of Strasbourg telescope during a Physical Sciences department field trip.

CHAPTER UPDATES

UA SEDS

The University of Arizona has just started up the year. We had our first meeting at the end of August and since then have had an open house for students to see our office as well as a Star Party with our Astronomy Club. The Rockoon Team is still set to launch at the end of September. We also have a team for ASCEND which is a weather balloon payload project and will have two launches over the course of the school year. We are really looking forward to all the events and activities planned this year.

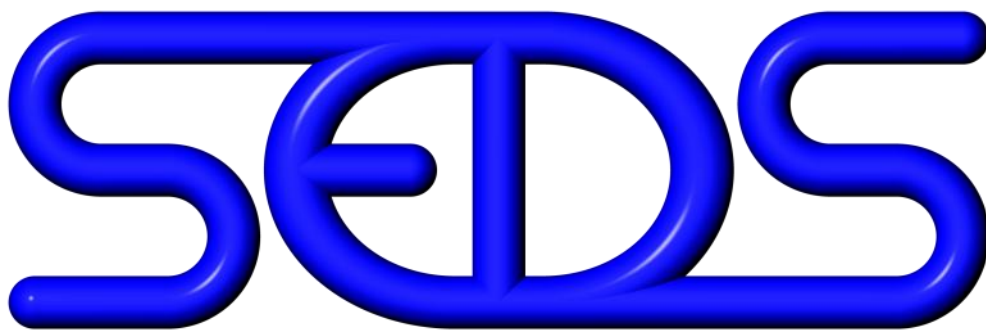
Sara Meschberger — UA SEDS Council of Chapters Representative, SEDS-USA Director of National Projects



Above: Students from UA SEDS playing a game at their open house. Photo courtesy of UA SEDS.

GWSS –SEDS

Inspired by the recent success of the “SpaceUP San Diego Unconference,” (an unconference is a free-form and participant-driven program rather than a top-down speaker program) the George Washington Space Society (GWSS-SEDS) chapter partnered with EVAdot to create the first “SpaceUP DC Unconference,” which was held at George Washington University in August. Over 100 people of all ages attended the two-day SpaceUP DC event (www.spaceupdc.org). Notable attendees included: Ken Davidian, FAA AST; Dave Masten, founder and CEO of Masten Space Systems ;and Jim Adams, NASA Deputy Director of Planetary Science. Following the compelling break-out sessions ranging from space nuclear propulsion to policy questions on why our species pursues space exploration, the event was topped off by “a Tribble tossing contest.” Increasing opportunities for student involvement, GWSS-SEDS coordinated free event registration for volunteers from the GWU student body. In addition to this event, the GWSS-SEDS chapter helped to organize weekly “NASA Next Gen” lunches during which students had the opportunity to interact with early-career employees at NASA Headquarters. Furthermore, to welcome international students participating in the International Space University’s Executive MBA/Space Odyssey Institute as they visited the DC area to complete their two-week module, the chapter organized a “space happy hour” networking event. Several members of the GWSS chapter also had the opportunity to attend an on-campus talk given by the crew of the STS-132 space shuttle mission. GWSS-SEDS is planning new events for the Fall 2010 semester and expanding relationships through a planned joint event with the AIAA-GWU chapter and ongoing activities with the GWU School of Engineering and Applied Sciences (SEAS). More information on this and other upcoming events can be found on the new GWSS website, www.gwspacesociety.org.



activities with the GWU School of Engineering and Applied Sciences (SEAS). More information on this and other upcoming events can be found on the new GWSS website, www.gwspacesociety.org.

Heather Bradshaw - GWSS-SEDS Council of Chapters Representative

Your chapter doing something cool, exciting and interesting? Other SEDS chapters want to know! Submit your quarterly Chapter Update and you may be selected to be featured in future NOVA Magazines!

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- Accelerate your future with a degree from one of the top-ranked programs in the nation! Science and engineering students from all disciplines are invited to apply.

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SEDS ALUMNI SPOTLIGHT

Name: Ben Herbert

SEDS Branches: University of Colorado, Boulder Chapter (CUSEDS), President and founding member 2005-2006.

Degree: 2005 BS, Applied and Engineering Physics, Cornell University
2006 MS, Aerospace Engineering Sciences, University of Colorado, Boulder.



Where are you employed and what are you doing there?

I'm currently working at Orbital Sciences Corporation in Dulles, VA. I had been working on the Orion Launch Abort System for 3.5 years and recently started working on Orbital's Commercial Orbital Transportation System (COTS) for delivering cargo to the International Space Station. I am a System Engineer working primarily with requirements and verification.

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

It's not a conference, per se, but volunteering to lobby on Capitol Hill during budget resolution is a great way to hone your ability to argue your case for space exploration. Understanding the political side of the space debate is crucial when so much of the space industry is financed by the government. Both the National Space Society and ProSpace organize annual lobbying campaigns. The experience can be valuable even if you don't fully agree with their pre-established agenda.

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

I co-founded the SEDS chapter at CU Boulder in graduate school, well after I was on my way to working in the space industry. As such, my primary benefit from doing so was networking and having the opportunity to spend time with fellow space enthusiasts. My reason for starting the chapter was more focused on helping like-minded people learn from the experiences of their peers and to promote a general awareness of space in the community. I think the chapter has been successful in achieving that goal by organizing lectures, Yuri's Night, outreach activities at local high schools and elementary schools, and public awareness events. I also hope that sharing internship and other work experiences to younger members helped them narrow down a general interest in space into a specific career path.

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

After one outreach event, a high school student with no previous interest in space told me and other CUSEDs members that we were “da bomb.” He showed a genuine interest in space after hearing our lecture and told us he would like to pursue a career working in it.

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

Remember that you’re working towards what you love. The only way to get through the academic ups and downs of college (and frustrations at work later on) is to fall back on the fact that, at the end of the day, you are passionate about your end goal. If you find yourself getting frustrated on the road to that goal, take a step back, think about the bigger picture, and use that end goal to gain strength. Learn to communicate, write, and present well; communication is the backbone of all good engineering and science. It is also very important to maintain a healthy work/life balance. If you don’t, you’ll find yourself quickly burned-out and jaded. Space is not all there is to life; explore the arts, humanities, and other sciences. Being well-rounded is the best way to know how to communicate your message about space exploration to those who have not yet been convinced of its worth.

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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

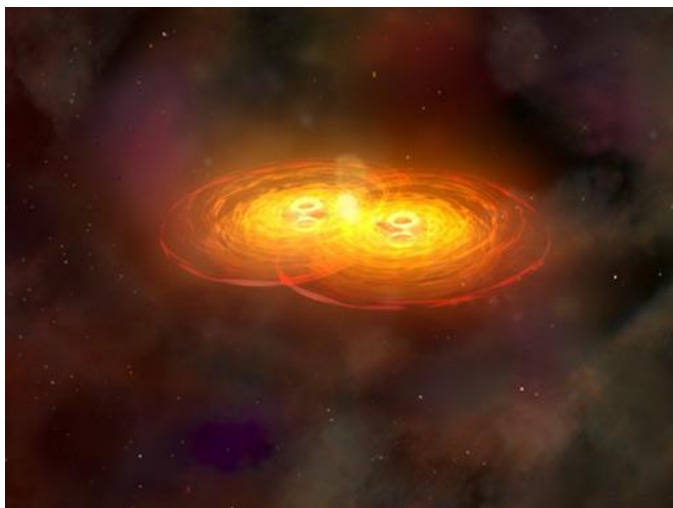


Imaging the Invisible

By Blythe Guvenen

17 June 2010

It is astonishing to contemplate the strange forms of matter and physical phenomena in the universe about which we are almost entirely ignorant, in particular when they are key to understanding the large-scale history, nature, and evolution of the cosmos. This is perhaps best exemplified in the study and search of black holes, the ultra-dense objects that populate the universe but due to their immense gravity emit and reflect zero light. This not only makes them a quandary for physicists, it also poses a devious impasse for astronomers, observational and otherwise. However, one ambitious team of cosmologists is attempting an unprecedented coordination of telescopes the world over to attain the resolving power to take an image of some of these elusive entities – if not just their ephemeral shadow.



Above: Artwork of two black holes merging. Such processes can, over time, form supermassive black holes.

directly back to the general theory of relativity. It seemed that this star was of adequate size to overcome all known physical forces and collapsed down to an object of zero size. Since an object's density is a measure of its mass over its volume, no size meant infinite density. This did not seem permissible under currently known natural laws, but both the theoretical and experimental verification were there. More evidence came pouring in as more supernovae were observed and the trajectories of a group of stars in the center of our galaxy were analyzed. Given the center of mass of the system, the only type of body capable of exerting such gravitational force without being seen would be none other than a black hole.

Black holes existed in theory long before they were ever verified. Albert Einstein's revolutionary theory of relativity described the force of gravity as distortions in the fabric of space-time induced by the presence of mass. One qualm that many scientists raised about Einstein's theory was that it permitted for objects of infinite density, and therefore infinite gravity. This seemed a legitimate concern until a massive supernova was observed in a star-dense region. Scientists monitored the nova and the aftermath to see what remained. To their incredulity, there was seemingly no residue in the smoke of the explosion. No white dwarf like after a planetary nebula and no neutron star like the ones observed after a sufficiently sized core implosion.

There seemed only one plausible explanation, and it tied

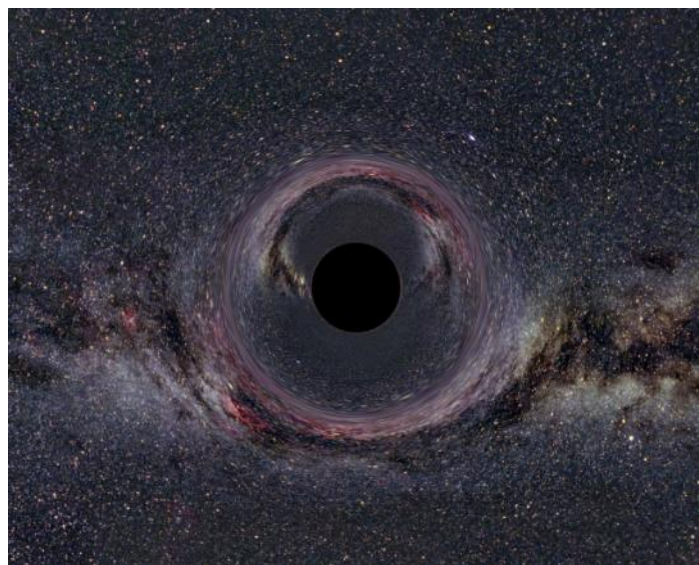


Above: A black hole ejecting jets of superheated gas.

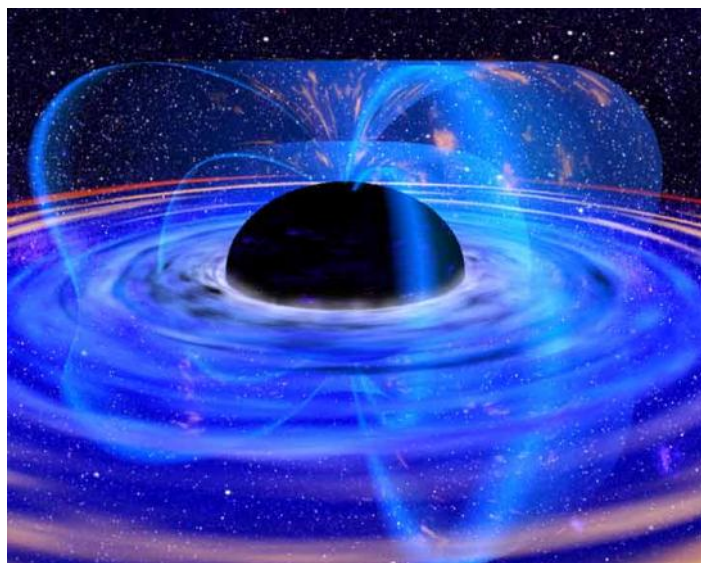
Snapping an image of a black hole has proved to be a spectacularly futile exercise. Due to its gravity well effect – a sort of “bottomless pit” of gravity – all matter and energy cannot escape beyond a certain threshold, called the event horizon, up to and including light itself. If a person was within the event horizon and shined a flashlight away from the black hole, the light beam would bend back on itself and fall in. This confluence of infinitesimal size and light absorption makes them fiendishly difficult to photograph. In fact, by principle, they are impossible to image, unless they are either interacting with luminous matter, feeding off a star, or lensing the light of a star behind it.

Obstinately, however, a team of cosmologists led by astronomer Jonathan Weintraub is in the midst of an ambitious project to survey the sky for photographic evidence of these silent monsters. Due to their fleeting and minuscule nature, the black hole hunt must be a

coordinated effort. By combining the resolving power of telescopes all over the world to systematically survey the sky for aberrations that may be indicative of black holes, they stand a good chance, within a few years, of detecting a microlensing or feeding in action. Lensing is the process by which a massive object distorts the light of an object behind it with respect to an observer in front of it.



Above: An artist's conception of microlensing on the band of the Milky Way.



Above: An artist's conception of the magnetic flux surrounding a black hole.

The telescope time aside, the largest challenge facing this team is the storage and cataloguing of this copious amount of data. If they attain the disk space to hold a worldwide database of sky survey, the next obstacle is to analyze each successive image of the same swath of sky to discern any anomalies that may point to the presence of a massive yet invisible object. If their findings are corroborated and confirmed, they will be among the first to have definitively imaged the effects of the most powerful and enigmatic of all celestial bodies.

The prospect of true unknowns on the largest and most fundamental of levels is what drives entire fields of science. In this case, black holes have informed profoundly on what we think we know about the nature of the physical

world we inhabit and speak to the idea that there are still great mysteries to be explored and that the best-laid sophisticated pictures of our cosmos may be fundamentally in error, or, at best, staggeringly incomplete. As we continue to probe the puzzles that the universe invariably poses, pioneers and visionaries like Dr. Weintraub will keep healthily challenging well-established conventional wisdoms about what is possible or true, and perhaps re-cast our perception of the framework of space and time in the process.

Preparing for Wallops

By Angela Marie Latona

This article is the second 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 of Venus.

For Massachusetts Institute of Technology graduate student Ben Corbin, "snow days" don't have quite the same prestige as they might for the rest of the student population. On this particular Wednesday (February 10), when most of Boston is enjoying an afternoon off due to a snow day, Corbin, along with BU professors John Clarke and Tim Cook, are tediously combing through and discussing data compiled since their last meeting a week ago in anticipation of their upcoming March testing of the Venus Spectral Rocket at NASA's Wallops Flight Facility in Virginia.

This meeting is to address a recent throughput measurement that failed.

A throughput measurement is a method of determining the reflectivity of a mirror and the efficiency of a grating device by aiming light through a vacuum chamber that is at extremely cold temperatures (near absolute freezing) and at a very low pressure, and then having that light pass through a slit. On the other side of the slit is the mirror and the grating device. The idea is that if the mirror and grating are at top efficiency, then most of the brightness that is recorded coming in should also be recorded coming out.

The rocket team used a small amount of hydrogen gas (and a whole lot of electricity to ionize the gas) to pass the light through to create a gas-discharge source before the light actually entered the vacuum chamber. The reason for this addition is because VeSpR is intended to measure emissions of hydrogen in the ultraviolet spectrum -- known as the Lyman-alpha line -- which appear at this particular ionization of the gas.

The hope was to produce a spectrograph -- an image of the incoming light after it has been reflected off of the grating and separated into its spectrum -- that would show whether or not the mirror and grating need to be recoated or replaced altogether.

After thirty seconds on the timer, they can determine whether the spectrometer's detector is receiving the incoming light or if it is being redirected incorrectly by the mirror and grating.

After a few adjustments and tweaks they wait to see what the microchannel plate detector collects. The MCP is a different detector than the spectrometer's and is highly sensitive to ultraviolet radiation, where Lyman-alpha lines would be seen. The data should appear on a computer screen as a bright circle, centered near the middle of the screen. Instead, it is a dull circle near the edges. The experiment must be repeated by changing the positions of the mirror and grating and hoping it will then produce the correct result.

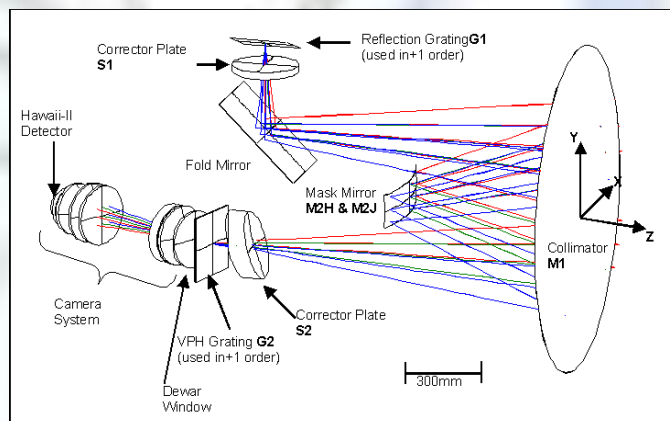
After this particular test session, the cryopump began making clanking noises -- a potential jam in the system. It is time to call it quits.

"It's a delicate test the way it's set up right now," professor Clarke agrees.

It is only a few short weeks before the first test flight is done, and the group knows these initial tests need to be performed now. They hatch a plan to get parts shipped in, fixed or built before the rocket is ready to test Lyman-alpha emission lines from Venus.

Spring Break: A Week of Tests

Corbin spent the greater part of his spring break driving down to Wallops, Virginia, to test the telemetry interface board, as well as to test the "skins" used to protect the rocket once it's ready for launch.



Above: Diagram of a spectrograph. Image from a Wikipedia article.

Corbin said that while the location might not have been equivalent to the beaches of Miami, it was definitely T-shirt weather, and the group enjoyed nice weather and a good amount of time at the Chincoteague National Park.

“We saw ponies, deer, swans, ducks, and horse poop,” he said.

Preparations and Testing

The group spent the greater part of the weekend driving down to the flight facility, and on Tuesday got their electronics testing completed. The testing included hooking up the interface and pulsing signals through it to see if the input matched the output. However, when the device was hooked up, the “digital words” that was recorded was different than the words going in.

“The last letter in the word was always one digit high or one digit low -- 2 when we expected a 3, 7 when we expected a 6,” Corbin said.

Knowing the fault might be with the Wallops equipment as easily as it might be the telemetry board, Corbin worked hard to find where the fault might be located. Eventually, the Wallops-based engineer switched out the ports and hooked up the machinery again – this time with success.

“After that, we had perfect signals crossing through the data stream, proving that we were getting the right signals out of our telemetry interface all along,” Corbin said.

Aside from the telemetry box, the VeSpR group also brought down the six payload skin sections for a few last-minute tests for hardness and durability under pressure and heat – two things that will increase drastically as the rocket is hurdled through the atmosphere.

“Over the years these can take some damage,” Corbin said. “We brought all six sections down with us so we could have Wallops mechanical engineers and technicians run bending and hardness tests on them.”

The skins were bolted down to a table and then pressed on from the top to ensure that the entire configuration did not bend more than 1/8th of an inch in total. VeSpR's skins passed the test.

A Breakthrough:

Parts of the Venus Spectral Rocket and its various parts have been carted between Boston and Wallops. They’ve been tested and, for the most part, have passed all of the most rigorous testing standards. Except one.

Corbin and the VeSpR team have been stumped for a long time. Until now.

For the past few months, the two scientists have been conducting throughput measurements, trying to determine if their grating and mirrors are calibrated correctly to reflect Lyman-alpha emissions from Hydrogen.

And for the past few months, they have been unable to successfully complete this test.

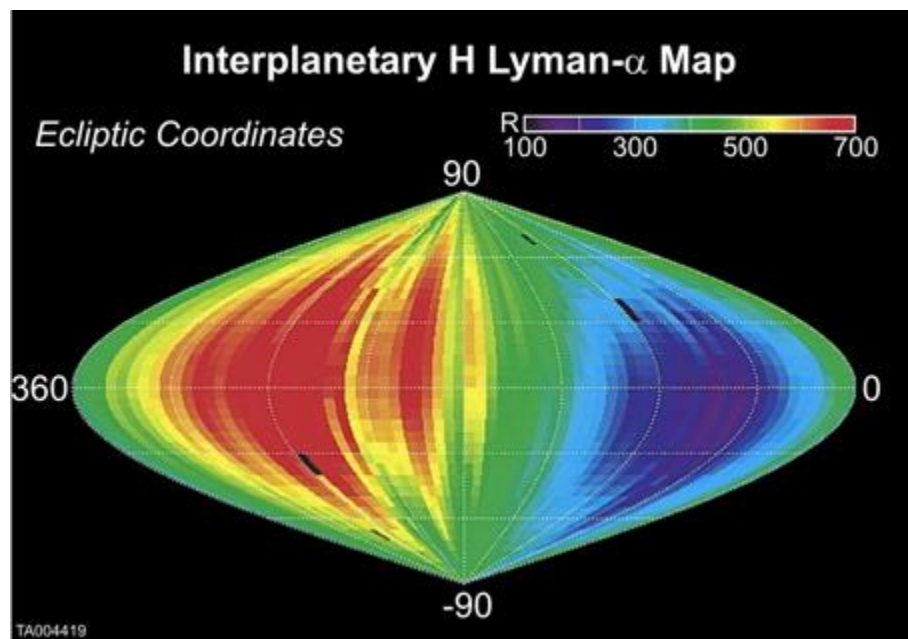
Once it was a faulty piece of machinery with the cryopump. Oftentimes it is misalignment of the mirrors and grating. Regardless, it has been a source of stress for the two.

One possibility for the more recent failure is a dirty grating that does not reflect light at the wavelength necessary for the project. A second, more probably reason, is that Corbin has been unable to align the optics just right (to within millimeters of a degree) – a highly difficult task with regards to accuracy.

“We keep hoping it's reason two [misalignment]. There are so many things that could get misaligned such that it won't work,” Corbin said. “We will definitely be doing more [testing].”

The wavelength for Lyman-alpha is around 1215 Angstroms, and if the grating were truly faulty and not reflecting this light correctly, it would mean buying a completely new one, adding both time and cost to an already stressful situation.

So instead, Corbin has spent countless hours aligning, and realigning, and realigning again. Each time hoping to get the emission lines he is looking for.



Above: The Lyman-alpha map for Hydrogen. Image credited to boulder.swi.edu

The team tried testing with a Mercury lamp because of how easy it is to change the grating angle with that particular emission spectrum. For Mercury lines, the vacuum chamber does not have to be pumped down with a cryopump, meaning that when the detector is turned on and the scientists do not see emission lines, they can simply realign the grating and try again.

"This is a quick process since I can just stand there and change the set screws to change the angle of the grating," Corbin said.

Corbin, who adjusted the set screws by less than a millimeter for each new test run, said the angle changes are tough to measure accurately.

"Last week we figured out what screw lengths correspond to what lines of mercury so we would know where to set it exactly when we used hydrogen Lyman-alpha. There's a certain order of Mercury that is very bright and is very close to the brightest order of Hydrogen Lyman-alpha, so we use this to figure out how close we are to the correct angle."

The next step was to test with a Hydrogen lamp. They brought the chamber down to vacuum and pumped it down with the cryopump. This process, unlike with the Mercury lamp, can take more than 24-hours to complete – all before testing can even begin. For this reason, the Mercury lamp is more efficient at determining the correct angle but, ultimately, the Hydrogen lamp must be used to detect Lyman-alpha lines.

"In the measurement we were setting up for, after we set up in the vacuum chamber and pumped down, we saw no Hydrogen Lyman-alpha line on our detector," Corbin explained.

Then, on April 1, came the breakthrough.

"We have a line location," one of the scientists wrote in an email to BU professor John Clarke and BU associate professor Tim Cook.

The emission line, while visible, is not centered where it needs to be, but Corbin now knows how much to move the grating to center it.

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 **February 2004** version of the NOVA:

Spotlight on Alumni:

Dr. Peter Diamandis, Founder of SEDS



In 1980, Dr. Peter Diamandis founded a small student organization at MIT that has since become the world's largest student pro-space organization, SEDS. He has since gone on to co-Found the International Space University where he served as the University's first Program Director and Trustee.

Dr. Diamandis is most notably the Founder, Chairman, and President of X-Prize, a non-profit organization promoting the formation of a space-tourism industry through a

\$10,000,000 prize.

Diamandis also serves as the Chairman of Zero Gravity Corporation, a commercial space company developing private, FAA-certified parabolic flight utilizing Boeing 727-200 aircraft. Additionally, Diamandis was a co-founder of Space Adventures.

Dr. Diamandis received his undergraduate and graduate degrees in aerospace engineering from the Massachusetts Institute of Technology (MIT) and his M.D. from Harvard Medical School. He has conducted research in a num-

ber of fields, including molecular genetics, space medicine, and launch vehicle design.

Dr. Diamandis has received a number of awards including MIT's Kresge Award, the 1986 Space Industrialization Fellowship, the 1988 Aviation Week & Space Technology Laurel, the 1993 Space Frontier Pioneer Award, and the Russian 1995 K. E. Tsiolkovsky Award.

Dr. Diamandis is perhaps our most prominent alumnus and an excellent example of the Aerospace excellence SEDS students



Caption describing picture or

This article comes to us from the first NOVA after SEDS-USA's rebirth in 2003. The organization had just come together again for the first time in years, and communication was finally re-opened at a national level. It is fitting, then, in this NOVA edition, to publish an Alumni Spotlight article on Peter Diamandis, founder of SEDS. You'll notice that the format of the Alumni Spotlight has changed much in the last 6 years—currently they are more interactive, with interview style questions and real candid responses from the Alumni being featured. However, this first

Alumni Spotlight provided an inspiration, and a starting point with which to develop the spotlight as it is today. To see a prime example of an Alumni Spotlight, check out this Quarter's edition on page 12.

AUGUST IN SPACE

August 5th, 1930—Neil Armstrong was born. Armstrong would go on to become the first man to step foot on the moon.
 August 6th, 1961—Gherman S. Titov is launched from the Soviet Union, becoming the 2nd human being to orbit the earth.
 August 7th, 1959—Explorer 6 is launched, a mission which would give us the first views of earth from space.
 August 8th, 1978—Pioneer Venus 2 is launched, which would go on to probe the atmosphere of Venus.
 August 11th, 1962—Vostok 3 is launched, carrying the Soviets third cosmonaut. This mission would go on to perform a close pass with the later launched Vostok 4.
 August 12th, 1977—Space Shuttle Enterprise breaks free of its mother ship for the first time.
 August 17th, 1958—Pioneer Zero blows up on the launchpad, destroying man's first moon shot.
 August 17th, 1970—the Soviets Venera 7 probe becomes the first man-made object to land on the surface of Venus, but is unable to transmit anything back due to the environment of Venus.
 August 19th, 1787—Astronomer William Herschel discovers the Saturn moons of Enceladus and Mimas.
 August 20th, 1975—Viking 1 is launched, becoming the first probe to land on Mars.
 August 20th, 1977—Voyager 2 was launched, touring the four largest outer planets over the next 12 years.
 August 21st, 1993—America's Mars Observer is lost due to a failure in the spacecraft's propulsion system.
 August 25th, 1981—Voyager 2 swings by Saturn, discovering six moons while in the vicinity of the gas giant.
 August 27th, 1962—Mariner 2 is launched, becoming the first probe to make a successful flyby of Venus.

SEPTEMBER IN SPACE

September 1st, 1979—Pioneer 11 passes within 21,000 miles of Saturn's rings, becoming the 1st man-made visitor to the planet.
 September 3rd, 1976—Viking 2 lands on Mars in the Utopia Planitia region.
 September 5th, 1977—Voyager 1 is launched on its journey to Jupiter and Saturn
 September 9th, 1975—Viking 2 was launched from Earth to Mars
 September 12th, 1959—Soviet Luna 2 becomes first object to "land" on the moon; slamming into the surface at an estimated 3.3 km/second
 September 12th, 1966—Gemini 11 is launched, becoming the 2nd to last mission of the Gemini program.
 September 17th, 1857—Konstantin Tsiolkovsky is born, who would go on to become the grandfather of the Russian Space Program.
 September 17th, 1930—Ed Mitchell, Apollo 14 lunar module pilot was born.
 September 17th, 1930—Tom Stafford was born. He would go on to serve on Gemini 6 & 9, as well as Apollo 10 and Apollo-Soyuz Test Project.
 September 24th, 1930—John Young, co-pilot of the first Gemini pilot, was born. He also served on a long list of missions including Gemini 10, Apollo 10, Apollo 16, and the 1st shuttle mission.

OCTOBER IN SPACE

October 1st, 1958—NASA is formed
 October 4th, 1957 - U.S.S.R. becomes the first nation into space with the launch of the Sputnik satellite
 October 4th, 1969—U.S.S.R. launches Luna 3, which orbits the moon & returns photos of over 70% of the far side.
 October 5th, 1882—Robert Goddard, Pioneering American Rocket Scientist is born
 October 12th, 1964—U.S.S.R. Launches Voskhod 1, the country's first three man space vehicle.
 October 13th, 1933—The British Interplanetary Society was founded.
 October 18th, 1989—Galileo Space Probe is launched from Space Shuttle Atlantis, beginning its 6 year journey to Jupiter.
 October 28th, 1998—Space Shuttle Discovery lifts off with 77 year old Senator John Glenn on board.
 October 29th, 1991—Galileo Space Probe observes asteroid en route to Jupiter, becoming first space probe to do so.
 October 31st, 1930—Michael Collins, command module pilot on Apollo 11, is born.

SEDS LEGISLATIVE UPDATE

SEDS-USA & Council of Chapters Quarterly Summary:

CoC SUMMARY:

June 30, 2010

- Discussion and updates among the chapters: UB, Caltech, UKentucky UA, UCF had brief summaries of their activities
- Discussion on the role of having a SEDS Policy position, concept of forming a three person committee to represent SEDS introduced.
- Discussion on promoting SEDS with social media: Currently utilizing: Facebook, Twitter, Linkedin and YouTube for SEDS-USA. Ways that chapters can utilize these tools
- Update regarding SpaceVision, <http://spacevision.seds.org/>, several new details released.
- Call for volunteers for the NewSpace Conference
- Brief discussion on the vacant project position on SEDS-USA, nomination and election dates discussed.

August 25, 2010

- Discussion and updates among the chapters: CUSEDSED, Purdue, OU, UB, UA, UCF, Caltech, GW, UCLA, Iowa State, Florida Tech, BU, UIUC and UKentucky had brief summaries of their activities
- SpaceVision update, discussion regarding accommodations, speakers, recent sponsorships, registration costs defined with date-dependent price breaks. Travel details discussed, Amtrak available from Chicago, nearest major airports: Chicago, Indianapolis & St. Louis, all pretty much the same distance.
- Discussion of SEDS projects exposure on the national level
- Survey of future national projects, fill out questionnaire regarding the activities your chapter would prefer.

EXEC BOARD SUMMARY:

- Sara Meschberger is the new Director of Projects.
- Expansion: New groups at North Dakota, Wisconsin, Memphis, several other groups have demonstrated interest in joining SEDS (Virginia Tech, West Virginia Univ, Univ of West Florida among others). An improved expansion kit is now available.
- Several ideas to further establish the Endowment Fund were introduced by Ajoy. Looking for people and companies that would be willing to donate to ensure a long future for SEDS chapters around the country. If you have any good contacts or want to help, let him know at vice-chair@seds.org.
- SEDS.org website improvements proposed, many developments established and recently implemented on the main site.
- The SpaceVision website has begun to get a broad overhaul with a lot of updates. Reminder that you can invite your chapter to attend SpaceVision 2010 via the Facebook.
- SEDS had a display table at NewSpace 2010. Many SEDS students attended and helped run the conference.
- SEDS Projects is surveying chapters to find out what types of projects should be pursued at the national level.
- YouTube competition introduced to promote SEDS, details available at <http://seds.org/more/projects/video-ad-contest/> or on the SEDS homepage.
- Motion Carries 4-0-1: Allocate \$100 towards prizes for competition.
- Motion Carries 7-0-0: The following positions for elections at spacevision2010: Chairman, Vice-Chairman Secretary, Director of Finance, Director of Chapter Affairs, Director of Chapter Expansion, Director of Publications, Director of Public Relations, Director of Educational, Outreach, Director of National Projects Director of High School Affairs, and Webmaster .

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 GALLERY



Above: A small group of UB-SEDS members gather around a work bench, hard at work assembling some rockets for their first launch of the year. Image Credit: Andrew Dianetti

Below: Some ISSS-SEDS members gather for a photo opportunity outside with their rockets ready for launch. Image Credit: Allen Ball



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

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the official publication of SEDS-USA

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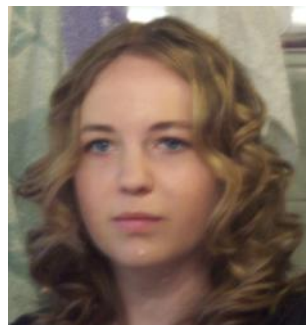
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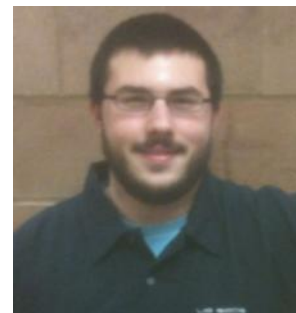


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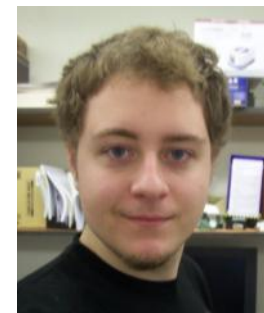
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SEDS Mission Statement:

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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