AIAA HOUSTON SECTION
Horizons
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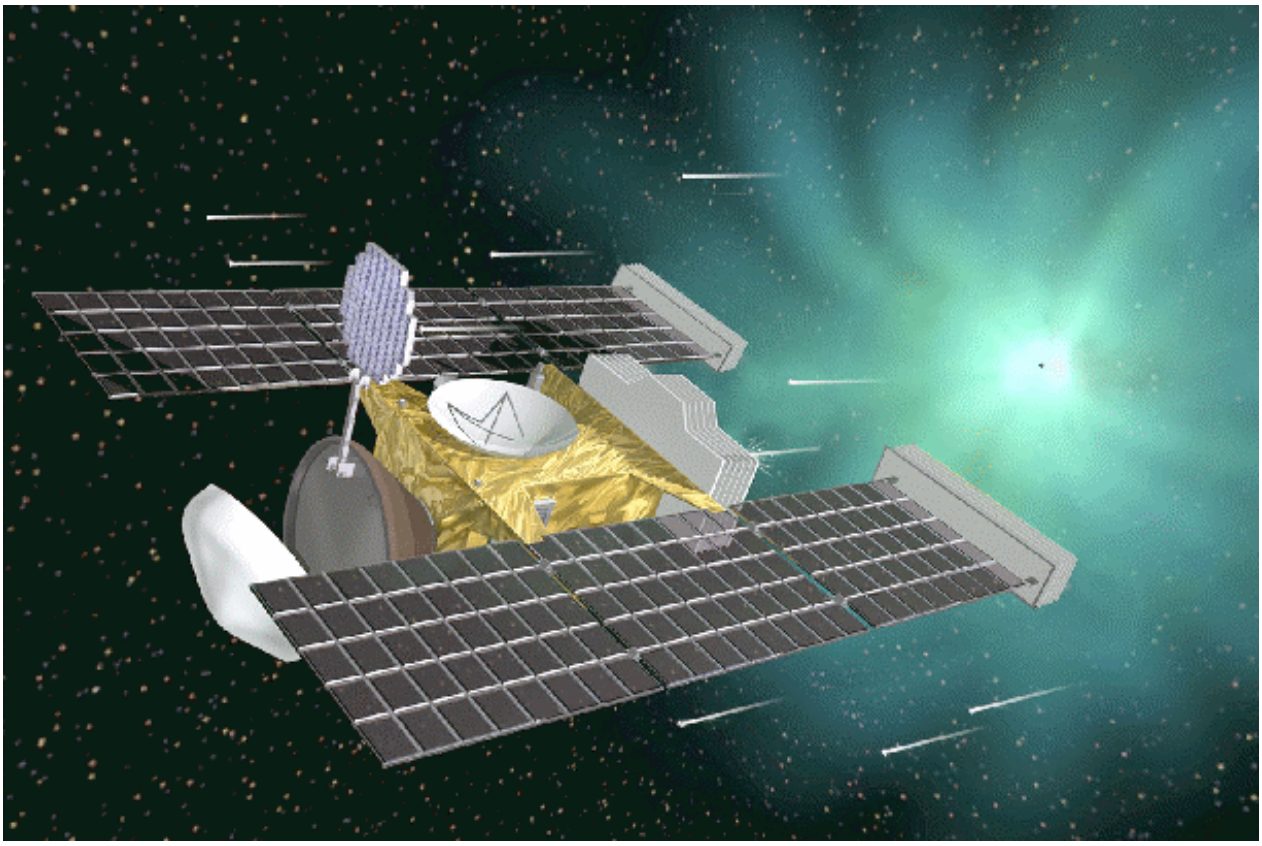
Stardust – Collecting A Piece of the Stars



Artist concept of Stardust's encounter with the nucleus of comet Wild-2 on January 2, 2004. The mission is set to bring back the first interstellar sample to JSC in January of 2006 (see page 5).

Horizons
February 2004

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Features

In Every Issue

Please submit stories and events to *Horizons* by **February 19**

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Chair's Corner

With one month already gone in 2004 we are spinning up for a whole series of educational events this Spring. February, March, and April all are filled with educational events for students. Among these are:

- Mars Settlement Design Competition
- Houston Hispanic Forum Career Day
- Science and Engineering Fair of Houston
- FIRST Robotics Competition

And many more! These events provide exciting volunteer opportunities for professionals who want to share their technical knowledge and inspire the next group of engineers and scientist. Generally, most of these events require only one weekend to support, but the payoff can be enormous. Be sure to check the calendar in the back of this newsletter and see if there is an event that interests you. With the new space initiative just recently announced and ongoing concerns about the 'aging aerospace workforce' take the time to invest in the future of our industry!

Michael L. Oelke
2003-04 Chairperson, AIAA Houston Section

JSC's Annual Mars Settlement Design Competition for High School Students

By Norman Chaffee, Executive Council Member

JSC and contractor employees who have children or Houston - area relatives in high school, grades 10 - 12, are urged to tell them about JSC's exciting upcoming Mars Settlement Design Competition for high school students in the Houston and southeast Texas area. This will be the sixth year that JSC has sponsored this competition as part of the JSC Engineers Week activities. There will be two sessions of the Competition this year. The competition will be held at the Gilruth Center and in the high bay area of JSC's building 9 over the weekend of February 20 - 22, 2004 and the weekend of March 5 - 7, 2004 (Friday evening to Sunday afternoon). The competition is an industry simulation game in which up to 140 students are divided into four competing student companies and asked to design a large human base on Mars. The scenario set 40 years in the future. The students experience the feeling of being a part of an aerospace company proposal team, trying to respond to a complex RFP with too little time and information. Each student team is provided technical training and a NASA/contractor CEO to help guide their activities.

After training sessions on Friday night and Saturday morning, the student companies prepare their proposals over a 24-hour period, and then present the results to a team of professional judges on Sunday morning. The judges select the winning student company. The $45 registration fee covers all meals and snacks, accommodations at the Gilruth Center, a competition tee shirt, and Certificate of Participation.

Competition details can be found at http://marsbase.jsc.nasa.gov or obtained from competition coordinator Norman Chaffee, AH2, at x33777. The registration deadline is February 12 for the March competition session.

Upcoming Booksigning with Dr. John Lienhard – Mar 25th

By Glenn Jenkinson, Executive Council Member

Mark your calendars now for a very special guest from right here in Houston! Dr. John Lienhard will conduct a booksigning and a lecture for our March dinner event at the Gilruth Center.

Dr. Lienhard is the M. D. Anderson Professor Emeritus in the departments of Mechanical Engineering and of History at the University of Houston. He is also the author and voice of the *Engines of Our Ingenuity* which is produced by KUHF-FM and heard nationally on Public Radio. His latest book, *Inventing Modern: Growing Up with X-Rays, Skyscrapers, and Tailfins*, follows the elusive meaning of the term 'modern' from Art Deco through the tailfins on 1950's automobiles.

Join us next month for an opportunity to meet Dr. Lienhard and see a great presentation!

42nd AIAA Aerospace Science Meeting held in Reno Nevada

By Sophia Bright, Executive Council Member

Nicole Smith, Merri Sanchez, Bill Atwell, and Sophia Bright attended the 42nd AIAA Aerospace Sciences Meeting in Reno, Nevada, January 5th to the 8th and represented the Houston Section and Region IV. The conference provided a multi-disciplinary forum for scientists and engineers from industry, academia, and government to "share and disseminate the scientific knowledge and research results with a view toward setting new milestones for human flight."

The Aerospace Sciences Meeting also provided an opportunity for the AIAA National organization to present awards to individuals and sections for their contributions to aeronautics and aerospace. The Houston Section of AIAA is classified in the Very Large Section category and received the following awards for the period from July 2002 to June 2003:

1st Place: Outstanding Section – Nicole Smith
2nd Place: Career Enhancement - Jesus Reyna, Jr
2nd Place: Communications – John Keener
1st Place: Membership – Sophia Bright
1st Place: Precollege Outreach – Joy Conrad
3rd Place: Public Policy – Chad Brinkley
1st Place: Young Professional – Brad Files

The Houston Section also received special recognition for The Mid-Level Professionals Workshop that was held in November of 2002.

Brewster Shaw received the Von Braun Award for Excellence in Space Program Management. This award gives national recognition to the recipient for his outstanding leadership and management skills that contribute to the success of the International Space Station program.

Brewster Shaw received the Von Brawn Award

While the awards were a highlight of our trip, the primary purpose of the Aerospace Sciences Meeting is to provide an opportunity for technical and operational committees to meet and plan for the upcoming year. Sophia Bright attended the first Web Advisory Team (WAT) meeting. The purpose of this advisory team is to develop and recommend to AIAA National, ideas and procedures to enhance the overall value of the AIAA Web site to members, as well as attracting prospective members. Bright and fellow Houston Section AIAA member, Murugan Subramanian, will be supporting this team over the next year.

Past Chair Nicole Smith received the Outstanding Section Award

Sophia also attended the Systems Engineering Technical Committee (SETC) Meeting. The SETC discussed plans for continuing their partnership with the International Council on Systems Engineering (INCOSE) to develop a standards guideline for systems engineering. Sophia will be helping to develop the requirements definition portion of this guideline. SETC will prepare for systems engineering workshops to be held at conferences throughout the next year.

Nicole Smith attended the Space Operations & Support Technical Committee meeting. The Space Ops TC discussed a number of new initiatives, including sponsorship of a "Design/Build/Fly" contest for rockets and high-altitude balloons. The contest will have three categories: high school, undergraduate, and graduate. The undergraduate and graduate contests will begin in August 2004 and the high school contests will begin the following year. The Space Ops TC is about to release their first newsletter to the general space operations community to facilitate the sharing of knowledge and events within the community.

The Space Ops TC routinely hosts a Spring workshop to discuss Tools and Technologies, Best Practices, Standards, etc. The 2004 workshop will be hosted by The Harris Corp in Melbourne, Florida. Interested parties in the host community are invited to attend, as well as TC members. In 2005, the AIAA Houston Section will host the workshop at the NASA/Johnson Space Center. In addition, the TC has drafted a "Space Operations Best Practices" document and is discussing developing an AIAA short course around this document.

Nicole also attended the Membership Committee meeting. The Membership Committee is involved in the recruitment and retention of members, as well as member services and rewards for active members. Membership is holding fairly steady at around 35,000 members (including several thousand international members). Nicole is currently the Membership Committee's liason to the Young Professional Committee, where she was a member for three years. Both groups are concerned with retention, involvement, and development of young members, especially during the transition from student to young professional. The feasibility of a mentoring program is being explored by both groups.

Bill Atwell met with his technical committee counterparts, in addition to supporting the Public Policy committee meeting. Merri Sanchez presented a paper at the History of Space Flight session entitled "Keeping the International Space Station Flying: The Challenges Without Shuttle". The presentation was well received by a standing-room-only audience.

All in all this was a very successful meeting for the Houston Section attendees. Congratulations to all of the award winners from the Houston Section. We look forward to sending another group of "winners" next year representing the Houston Section.

Volunteers Needed for the Mars Settlement Design Competition

by Norman Chaffee, Executive Council Member

Volunteer staff are needed for the Sixth Annual Mars Settlement Design Competition for High School Students (see article on page 3). This competition is held on a weekend at JSC each winter, and this year there are two sessions of the competition - the weekend of February 20 - 22, and the weekend of March 5 -7, 2004. Volunteers needed include:

Student Company Chief Executive Officer (CEO)
This volunteer role serves as the CEO of one of the four competing student companies. The work starts with meeting the student team at 7:30 a.m. in the Gilruth Center for breakfast on Saturday morning (Feb. 21 or March 6), and then staying with them all day to help them organize and plan their activities. Your role is not to provide technical recommendations or guidance, but is a management role in which you help the students and their leaders establish a process by which they can plan and complete the work, and integrate it into a presentation by the deadline. Typically, 2 or 3 people serve as co-CEO's so that the intensity is less for each volunteer. The duty lasts until late on Saturday evening. All meals for CEOs are provided.

Technical Trainers and Advisors
This volunteer role serves as a technical trainer and information resource for the students in one of four general areas. The requirement is to meet the students at 8 a.m. on Saturday morning (Feb. 21 or March 6) in JSC's building 9 (the mockup and training facility) and provide a briefing in one of the following areas:
1. Structural concepts
2. Human and Life Support System concepts
3. Computer Systems/Automation/Robotics concepts
4. Communications and Base Operations concepts

The student briefing materials are pre-made and the role of the volunteers is to customize the material, if desired, and to give the briefing to the students and be prepared to answer general questions about the technical area. We recruit 3 or 4 people for each of the subject areas to minimize the impact on any one person. The requirement is complete by noon on Saturday, but volunteer trainers are urged to stay through lunch (provided) to answer questions.

Judge
This volunteer role serves as a Judge for the student presentations in the Gilruth Center on Sunday (Feb. 22 and March 7). The requirement is to be at the Gilruth Center for Judge's orientation at 8:30 a.m. The student presentations will begin at 9:00 a.m. and be completed by 12:30 p.m. Lunch will be provided for the Judges. After lunch the Judges will convene in the Gilruth Center and select the winning student team proposal; and will prepare a brief critique of each presentation. The duty is complete at that time - about 3 p.m. - but Judges are urged to stay for the announcement of the results and the presentation of the awards.

Volunteers will be provided with complete data packages on the requirements of the duty and will receive a Competition tee shirt and complimentary meals while they are serving.
Details about the Competition can be found at http://marsbase.jsc.nasa.gov or contact Norman Chaffee (281-483-3777) for more information.

Dr. Mike Zolensky and The Stardust Mission

by Dr. Al Jackson, Space Sciences Chair

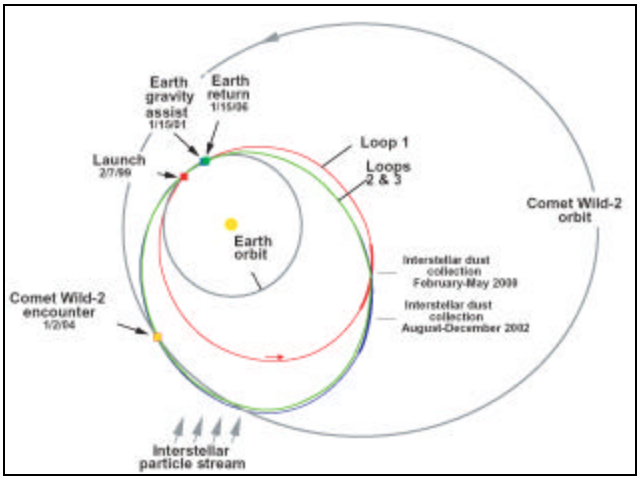
While the Mars probes Sprit and Opportunity dominated the news, another spacecraft probe, Stardust, was completing its own important scientific achievement. We were honored at the January 21 2004 dinner meeting to have Dr. Mike Zolensky brief us on the Stardust Mission. Mike is the JSC Associate Curator for Interplanetary Dust and a Co-Investigator on the Stardust Mission.

The Stardust Mission began as an experiment to capture interstellar dust. Interstellar dust, passing through the Solar System, was detected by the Ulysses and Galileo Spacecraft. It is now known that a stream of interstellar dust flows continuously through the solar system.

A bold scientific adventure to capture and return some of this dust to Earth was envisioned. While each of these dust grains is only a 1/50th the width of a human hair, their very high speed makes capturing them a very difficult task. However, the information they contain is tantalizing. These tiny particles are the pulverized flotsam of the galaxy, bits of ancient stars that exploded as they died. This "stardust" is literally the stuff of which we are all made, being the source of nearly all of the elements on Earth heavier than oxygen.

Stardust was visualized as an international mission to collect interstellar particles, without damaging them, and return them to the Earth. Stardust uses an extraordinary substance called aerogel as the capture mechanism. Aerogel is a silicon-based solid with a porous, sponge-like structure in which 99 percent of the volume is empty space. Mike passed around a sample of aerogel for the audience to examine. The unique physical properties of aerogel have been tested and would allow it to decelerate and capture the small, fast moving stardust particles. Once captured, the dust-laden aerogel will be returned to Earth for study.

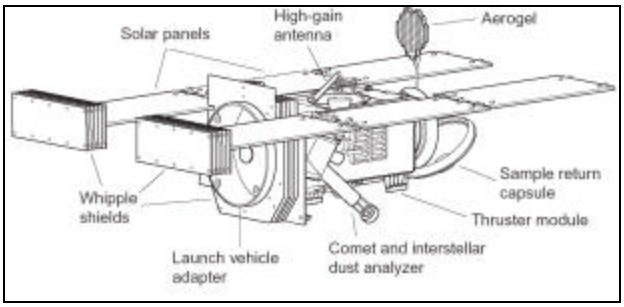
However, Stardust is not just capturing interstellar dust. During the mission planning process one of the researchers noticed that spacecraft Stardust could, with a slight orbit adjustment, encounter comet Wild 2 (pronounced “Vilt-2”). Comet Wild 2 is a ball of dirty ice and rock about 3.3 miles in diameter. Discovered in 1978, Wild 2 orbits the Sun once every 6.39 years on a trajectory that carries it nearly as close to the Sun as Mars is, and as far away from the Sun as Jupiter. The mission profile looks like this:



Orbital trajectory for the Stardust spacecraft

By traveling parallel to the comet and flying through its coma, Stardust could collect material from this body as well. Therefore, Stardust became not only the first U.S. mission dedicated to returning an extra terrestrial sample to Earth in over 30 years, but also the first one to bring samples from two separate sources.

In addition to the aerogel, there are three dedicated science packages on Stardust -- the two-sided dust collector, the comet and interstellar dust analyzer, and the dust flux monitor. Science data will also be obtained without dedicated hardware. The navigation camera, for example, provided images of the comet both for targeting accuracy and scientific analysis. The spacecraft probe looks like this:



Stardust spacecraft configuration

Stardust successfully made its interstellar dust collections in 2001 and2002, but the highlight of the mission occurred on Jan. 2, 2004, at 11:40:35 am PST, when the 5-meter-long (16-foot) Stardust spacecraft sailed past comet Wild 2 at a distance of about 188 miles and at a relative speed of 13,650 miles per hour. It made its comet dust sample collection and snapped some of the best pictures we have ever seen of a comet.

Mike displayed a sequence of high resolution photos, showing some very interesting features not seen

on a comet before. The high resolution pictures will be released later this spring. (One can see a low resolution sequence at the project's web site, **http://stardust.jpl.nasa.gov)**

Stardust is scheduled to use its thrusters to fine-tune its flight path three times as it makes its final return to Earth on January 15, 2006. Soon after the final trajectory maneuver at an altitude of 68,805 miles, Stardust will release its sample return capsule. After the capsule has been released, the main spacecraft will perform a maneuver to divert itself to avoid entering Earth's atmosphere. The spacecraft will remain in orbit around the Sun.\

The capsule will enter Earth's atmosphere at a velocity of approximately 12.8 kilometers per second (28,600 miles per hour). As the capsule descends, its speed will be reduced by friction on its heat shield, a 60-degree half-angle blunt cone made of a graphite-epoxy composite covered with a new, lightweight thermal protection system. The capsule will slow to a speed about 1.4 times the speed of sound at an altitude of about 30 kilometers (100,000 feet), at which time a small pyrotechnic charge will be fired, releasing a drogue parachute. After descending to about 3 kilometers (10,000 feet), a line holding the drogue chute will be cut, allowing the drogue to pull out a larger parachute that will carry the capsule to its soft landing. At touchdown, the capsule will be traveling at approximately 4.5 meters per second (14.8 feet per second), or about 16 kilometers per hour (10 miles per hour). In all, about 10 minutes will elapse between the beginning of the entry into Earth's atmosphere until the parachute is deployed.

The landing site at the Utah Test and Training Range near Salt Lake City was chosen because the area is a vast, desolate and unoccupied salt flat controlled by the U.S. Air Force in conjunction with the U.S. Army. Once the sample return capsule is recovered, its contents will be immediately transported to its final destination, the planetary material curatorial facility at NASA's Johnson Space Center in Houston. (Note: JSC is the prime NASA curatorial facility for Lunar materials, Antarctic meteorites and Space Dust.)

The Houston AIAA section thanks Mike for the excellent presentation and the pride the JSC community takes in being part of and elegant scientific venture like Stardust.

Call for CVD Volunteers

by Nicole Smith, Public Policy Chair

Are you interested in public policy? Have you grumbled about "those People in Washington, D.C. making decisions about manned spaceflight even though they know nothing about it"? Then AIAA Congressional Visits Day is for you!

This is the perfect opportunity for us to educate our local congressional leaders about key issues here at JSC. CVD 2004 will be held on 21 April 2004 in Washington, D.C., but preparations need to begin after the first of the year. Even if you cannot make it to CVD, your inputs and help in preparing our presentation is key. Please contact Nicole Smith (Houston Section Public Policy Chair) at AIAANicole.Smith-1@nasa.gov (remove 'AIAA' before sending) or 281.244.7145.

Three-Minute Commercial

by Jesus Reyna, Professional Development Chair

In business school, students learn how to conduct a SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats) for an initiative, project, or business. They also learn about the importance of writing an executive summary that is concise and to the point. Why? Because executives (like the rest of us, or possibly your next employer) have relatively short attention spans. So if we want to make a good first impression, we must have a three-minute commercial of ourselves ready to be delivered on a moment's notice. This is your equivalent of a 30 second TV commercial, aimed to sell. You'll have just one opportunity to get it right, so be sure to prepare.

Set some time aside this month to review and update your resume and perform a SWOT analysis of yourself. Write down your short and long term career goals. Your short-term goals should be stepping stones toward your long-term goals. This new year, commit yourself to working toward these goals. Draft a three-minute commercial to sell yourself to your next prospective employer. Practice your commercial until it becomes second nature. You'll be surprised how many opportunities you will have to deliver your commercial. When someone asks you for your resume, you will have yours ready to go.

Professional Development Committee

by Jesus Reyna, Professional Development Chair

If you would like to be part of the standing Professional Development Committee, contact me at AIAAjr.reynajr@boeing.com (remove 'AIAA' before sending). Not only will you be taking an active role in the development of our chapter members, but you will also be gaining the satisfaction of knowing that you can make a difference.

Lunch and Learn Report: Vision Based Relative Navigation For Autonomous Proximity Operations

by Ron Sostaric, GN&C Technical Committee

On January 8, 2004, Dr. John Valasek from Texas A&M University and Dr. Declan Hughes of StarVision Technologies jointly presented "Vision Based Relative Navigation For Autonomous Proximity Operations." The AIAA Houston section's Guidance, Navigation, and Control Technical Committee sponsored this presentation.

Under contract from NASA JSC, researchers at Texas A&M and StarVision Technologies have been developing an innovative Vision-based Navigation system called VisNav. Using a specialized Position Sensing Diode (PSD) that receives light emitted from beacons with specified wavelength and waveform, VisNav accurately determines the line of sight vector and orientation angles at an update rate of 100Hz.

VisNav has a number of different applications, such as spacecraft docking, precision aircraft landing, and autonomous aerial refueling. VisNav may eventually enable aerial refueling of two Unmanned Aerial Vehicles (UAVs). Texas A&M and StarVision Technologies are currently developing a radio controlled aircraft application as well. This application requires the RC pilot to fly using a data glove while wearing a sensor backpack that communicates directly with the aircraft.

After the presentation, Dr. Hughes led the group down the hall to the JSC Navigation Systems and Technology Laboratory (NSTL) for a laboratory demonstration of the VisNav system. He demonstrated a working VisNav system, which added greatly to the overall enjoyment and understanding of the presentation.

Thanks to all involved with this event for your support and/or your attendance. Special thanks go to Dr. Valasek and Dr. Hughes, for giving a very interesting and informative presentation to the fifty-seven attendees. Each speaker was given a gift from our section- our Evolution of Flight poster celebrating 100 years of powered flight. Our speakers agreed to provide their PowerPoint charts for our committee's web page at www.aiaa-houston.org, and videotape copies of this event are available for loan by calling Douglas Yazell at 281-244-3925. (AIAA membership is not required.) Our committee continues to search for qualified engineers and students to join our seven current members.

Calendar

February 2004

6	Deadline for ATS Abstracts
20	Dinner Meeting: Distinguished Lecture by Dr. George Ka'iliwai
20-22	Mars Settlement Design Competition (Judges needed)
22-28	National Engineers Week (Speakers needed)
28	Houston Hispanic Forum Career Day

March 2004

5 - 6	Mars Settlement Design Competition (2nd)
25	Dinner Meeting with Dr. John Lienhard
25 – 27	Science & Engineering fair of Houston (Reliant Park)

April 2004

1 – 3	FIRST Robotics "Lone Star Regional" Competition (Reliant Park)
2 – 3	Region IV Student Paper Conference (Judges Needed)
16	Annual Technical Symposium (ATS)
16	Dinner Meeting (in conjunction with ATS)

May 2004

6	Space Day
20	Dinner Meeting (TBD)

June 2004

17	Awards Banquet

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