



**2003 EXPLORING  
ENGINEERING AND  
TECHNOLOGY**



hosted by

**The Society of Women Engineers Rocky Mountain Section,  
Lockheed Martin Space Systems Company,  
Junior Achievement of Rocky Mountain, Inc.  
and  
The Women's Foundation of Colorado**

Summary of Success  
April 28, 2003

# FACT SHEET

## **WHAT:**

The first annual Exploring Engineering and Technology event, designed to stimulate and encourage girls in grades 6 through 8 to pursue careers in engineering and technology, included motivational speakers, hands-on workshops, volunteer mentors and educational exhibits.

## **WHEN:**

Monday, February 24, 2003 from 9:00 a.m. to 1:00 p.m.

**WHERE:** The Adam's Mark Hotel in downtown Denver

## **WHY:**

We want to encourage girls to pursue careers or interests in math, science, engineering, computers and technology because:

- Only 4% of Colorado girls specify engineering as a career interest on SAT tests
- A scant 1% of girls in Colorado indicate an interest in a computer science career
- Women make up 46% of the Colorado labor force but only 25% of technical fields

## **WHO:**

- 585 middle school girls (52% of the 1,100 registrations received)
- Over 75 adult chaperones (parents and teachers) and 140 volunteers attended
- Ten school districts participated
- Denver Public Schools students made up 55% of total; Aurora Public Schools 12%
- Over 46% minority participants
- Booths showcased 14 exhibitors from higher education, community/professional organizations and governmental/educational entities

## **HOW:**

- Nine organizations and individuals contributed \$26,750 to cover direct expenses
- The Adam's Mark Hotel and other companies provided in-kind services valued at over \$15,000.
- Sponsors included the following:
  - ◆ Lockheed Martin ◆ Ch2MHill ◆ Adam's Mark ◆ Society of Women Engineers
  - ◆ Agilent Technologies ◆ Chambers Family Fund ◆ The Women's Foundation
  - ◆ Holme Roberts & Owen ◆ Brett Family Foundation ◆ KST Data ◆ Raytheon
  - ◆ Rockwell Automation ◆ TCF National Bank ◆ US Bank ◆ J.D. Edwards
  - ◆ Equal Opportunity Publications ◆ Chipotle ◆ Sun Microsystems ◆ Weekender

## **IMPACT:**

- In post-program survey (91% return rate), 78% of girls stated that the event was fun
- Over 87% stated that they learned more about engineering/technology fields
- Over 60% indicated an increased level of interest in engineering/technology careers

## Quotes from Attendees ...

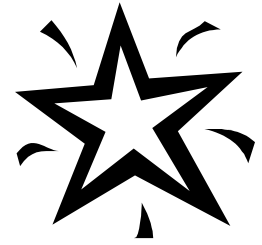
"I enjoyed coming and learning more about engineering." - **Shaudea, Rachel B. Noel Middle School**

"This is a fantastic opportunity for our young ladies to be exposed to and learn more about the variety of professions that are open to them. They also experiences some exciting hands-on activities." - **Middle School Science Teacher**

"I like all of the topics, PERFECT. I liked meeting all the people who actually do these jobs." - **Hana, Hill Middle School**

"I am really glad I got to participate in this event because it was really fun and allowed me to learn a lot of facts that were new to me." - **Gracie, Hamilton Middle School**

"Lots of fun, and now I will consider reaching for the sky." - **Heidi, Erie Middle School**



"My students are so eager for this. A huge thank you for all who created this. My students felt so empowered just knowing about it and being invited." - **Middle School Counselor**

"I want to give thanks for allowing us girls to have a good time. I enjoyed being one of the lucky girls to come and join you." - **Carmen, South Middle School**

"The people who took the time to teach us were wonderful and I would like to thank them." - **Mandy, Oberon Middle School**

"It was really cool to have so many volunteers helping. Even though I was out of school, I still learned a lot." - **Brittany, Smiley Middle School**

## Summary of Success

The first annual Exploring Engineering and Technology event was a huge success. Successes are summarized below. Planning details and statistics are included in this report.

Over 1,100 registrations were received for 500 available spaces for middle school girls. With the help of a last minute donation from Lockheed Martin, the number of available spaces was increased to 575. Confirmed registrations totaled 585 middle school girls. In addition, there were over 75 chaperones in attendance with the girls.

Fundraising efforts by the planning committee raised \$26,750 from nine organizations and individuals. Expenses totaled \$26,475. Remaining funds will be held over for the 2004 event. Considering the slump in the economy and a late start for fundraising, this was a remarkable achievement. Several companies, including the Adam's Mark Hotel, provided in-kind services valued at over \$15,000.

The complete list of sponsors includes: Lockheed Martin Space Systems Company; Ch2MHill; Agilent Technologies; Adam's Mark Hotel; The Society of Women Engineers Rocky Mountain Section; Chambers Family Fund; The Women's Foundation of Colorado; Holme Roberts & Owen LLP; Brett Family Foundation; KST Data Inc.; Raytheon, Denver; Rockwell Automation, Denver Branch; TCF National Bank; US Bank; Equal Opportunity Publications, Inc.; J.D. Edwards; Chipotle; Sun Microsystems, Inc.; Weekender.

Over 140 volunteers provided invaluable support to the event mostly as mentors, and as coordinators and support staff. The planning committee consisted of 12 individuals from the hosting organizations.

Fourteen exhibitors shared information about programs or resources for girls. The exhibitors included Girls Inc.; DeVry University Summer Scholars Program; Colorado School of Mines Women in Science, Engineering and Mathematics; Junior Achievement of Rocky Mountain Inc.; Society of Women Engineers Rocky Mountain Section; J.D. Edwards; US Department of Labor Women's Bureau; Colorado MESA; Denver School of Science and Technology (a new DPS charter high school); National Society of Black Engineers Future City Competition; University of Denver Making of An Engineer Program; USborne Books at Home; and Hamilton Middle School Team C Technology Exploration in Art.

A survey was provided at the conclusion of the event. Over 90% of the girls turned in a completed survey in addition to 46% of the chaperones and volunteers. Over 78% of the girls agreed that the event was fun and over 87% said they learned more about engineering and technology careers due to the event activities. Over 60% of the girls indicated that this event has increased their interest in pursuing a career in engineering or technology.

This annual event will be repeated each February to support National Engineers Week and the Introduce a Girl to Engineering Program. The hosts have already agreed to co-host the event in 2004, as well as setting higher goals for fundraising and attendance.

## The Issue

Girls of today are presented with gender biases and stereotypes that sometimes steer them away from careers or interest in the fields of math, science, engineering, computers and technology. We are working to change that reality. A coalition of organizations and businesses has come together to provide a space for girls to explore, to question, to do, and to learn. The girls walked out of this event inspired by the wonders of technology, and inspired by the incredible people who hold positions in those fields today.

In an effort to squelch the stereotype that women aren't suited for technical professions, middle-school girls from across the Denver metro area convened to explore the real-world experiences of women in engineering, science and technology.

As part of National Engineers Week and the Introduce a Girl to Engineering program, some of Colorado's leading women professionals in science and technology introduced networking and mentoring basics in interactive workshops of 20 to 30 girls each.

Participants in the workshops experienced hands-on lessons in everything from developing adaptive technology for people with physical limitations, to constructing and programming computer robots made of LEGOS. (A complete list of workshops is attached.)

Consider:

- Only 4 percent of Colorado girls specify engineering and 1 percent specify computer science as career interests on SAT tests.
- While women make up 46 percent of the Colorado labor force, they hold only 25 percent of technical professions.

"Most girls lose interest in technology in middle school," said Sandra Scanlon, President of the Society of Women Engineers, Rocky Mountain Section. "Many have exceptional skills in math and science but somehow get the idea that women aren't welcome in technical professions. This effort is designed to head off such impressions at an early age and show that engineering and technology are fun."

## Event Details

**There were three components to the event:** The **Welcoming and Opening Remarks** set the stage for what the girls could expect to accomplish and enjoy throughout the day. The **Interactive Workshops** focused on hands-on displays and demonstrations of various areas of science, engineering and technology. Lastly, at **Lunch** everyone convened for closing remarks and raffle prizes. Each student received a T-shirt and a bag full of information on careers in engineering and technology, information on necessary courses to take in high school, scholarship and career guidance information from local minority and engineering organizations, as well as a notepad, pens, and other give-aways.

### EVENT MISSION

To combine female Middle School students, parents, teachers, and counselors with engineering and technology professionals in order to create a unique learning experience for all involved and to get pre-college students excited about math, science, engineering and technology.

### EVENT OBJECTIVES

- Introduce female middle school students (middle school as defined by each school district) to real world aspects of science, engineering and technology and to the many diverse fields available.
- Give female middle school students, their parents, teachers, and counselors a chance to interact with engineering and technical professionals to show engineering and technology is fun.
- Introduce networking and mentoring basics to female middle school students.
- Introduce students, parents, teachers, and counselors to the local organizations within the engineering and science community and the resources available.
- Provide an opportunity for local corporations, their employees, and the community to come together and support students to succeed in math and science.

### IMPACTS/EXPECTED RESULTS

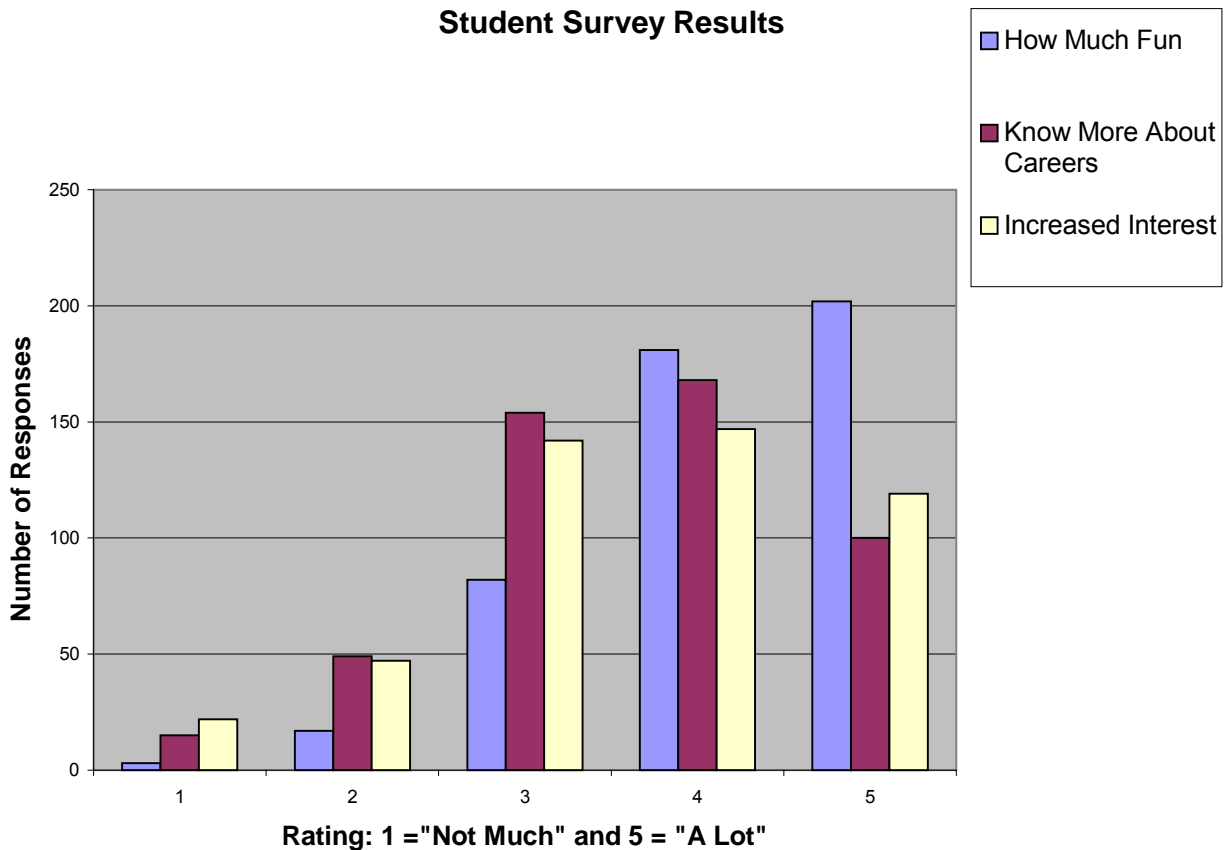
The overall goal of the event was to introduce engineering and technology careers to girls who may not otherwise be exposed to role models in these careers. Additionally, the importance of math and science were explained and presented as “cool” subjects in school.

The whole activity served as a source of information on engineering and science for a group of students who may not have much contact with engineers or scientists, and in particular women engineers. This will also give us a chance to expose teachers and counselors to the fact that women can become engineers, scientists, and hold jobs in technology fields. Interacting with industry can provide them with information on what courses students need to take in order to pursue a science or engineering education.

## SPONSOR OBJECTIVES

- Stress the importance of math and science classes in Middle and High School, in order to prepare for a college major that can lead to a well-paying job.
- Give the students and professionals a chance to learn and practice mentoring, which will hopefully encourage engineers, especially women, to attain high levels of professional achievement.
- Feed the engineering and technology employment pipeline.

From the student surveys, it is evident that these objectives were met.



Open Ended Question Response Totals:

Favorite Workshop - Steady Hand Game (271); Inside Computers (32)

What do you want to be? - Doctor (58); Vet (38); Engineer (35)

Favorite Subject - Science (143); Math (134)

Least Favorite Subject - Math (163); Language Arts (65)

Do you have your own computer or regular access to one? Yes=397, No=70

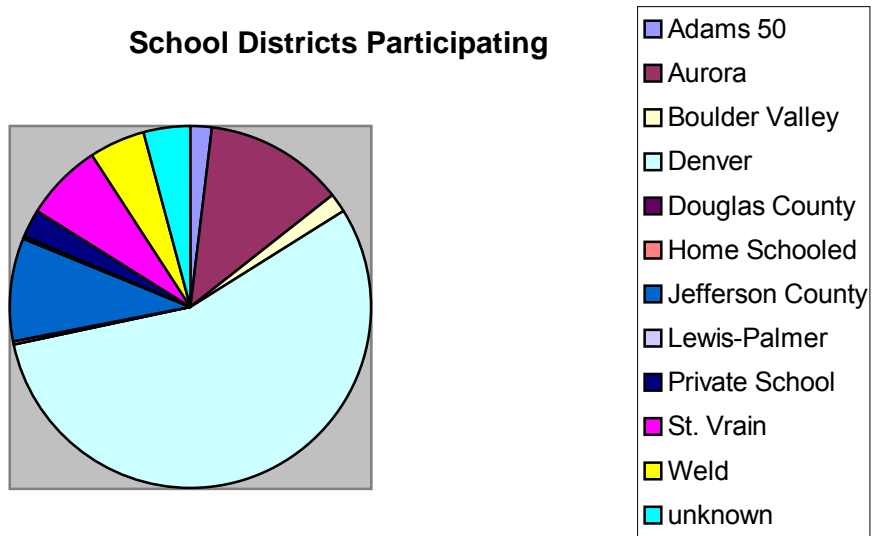
## PROGRAM SCHEDULE Monday, February 24, 2003

- 8:00 a.m. – 8:45 a.m. Training for mentors and guides with light breakfast.
- 8:45 a.m. – 9:20 a.m. Registration/Information for all participants with light breakfast.
- 9:20 a.m. – 9:40 a.m. Welcome/Opening Remarks by Keynote Speaker.
- 9:45 a.m. – 12:15 p.m. Workshops including hands-on demonstrations and activities.
  - 9:45 a.m. – 10:55 a.m. Various workshops, 20-30 girls pre-registered per session.
  - 11:05 a.m. – 12:15 p.m. Various workshops, 20-30 girls pre-registered per session.
- 12:15 p.m. – 1:00 p.m. Lunch/Closing Remarks/Raffle.

## REGISTRATIONS

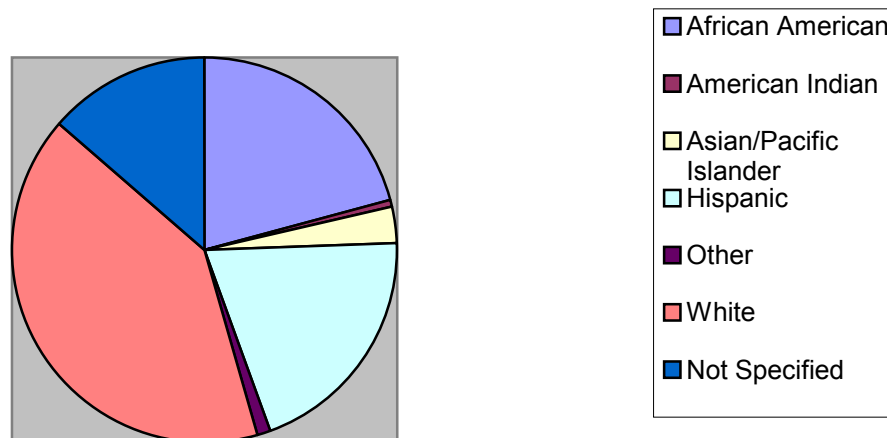
Of the 585 registrations received, over 55% were from students in the Denver Public School system. Aurora Public School registered over 12%. The remaining 8 school districts that registered each had between 1 and 10%.

**School Districts Participating**



Of the 585 girls registered, over 46% specified a demographic other than white. This information was voluntary, and as such we did not receive demographic information from 12% of the registrants.

**Demographics**





## HANDOUTS

Items sent home with each attendee included an aerospace workbook from Lockheed Martin, brochures listing what courses to take in high school, descriptions of various engineering disciplines, websites listing career guidance and scholarship information, one *Woman Engineer* and one *SWE* magazine, and various trinkets from sponsors. The teachers and chaperones each received a 26-page engineering activity book complete with answers, a CD-ROM containing an interactive program called "Is There An Engineer Inside You?" as well as other brochures and information.

## WORKSHOPS

### Steady Hand Game

In this session, students explore the fundamentals of electricity. They build an electrical circuit that includes an energy source, resistance, a light and a switch. The completed assembly is also a steady hand game that students will have fun playing and demonstrating to family and friends.

Presenter Information: The presenters for this Workshop are Agilent employees.

### Robotics and LEGO Mindstorms

This workshop will provide an introduction to programmable robots by means of a programmable computer inside of a LEGO brick. Students will construct a LEGO robot and then program it to navigate obstacles, follow trails or react to changes in light, directed by its sensors.

Presenter Information: Kristin Martin is a recent technical graduate of Pueblo Community College. She majored in Industrial Maintenance with an electronics base, specializing in the semi-conductor field. Within the last two years, Kristin has assisted the PCC Technology Department with technology fairs and various robotics programs, including the Regional Battlebots IQ Program and LEGO Mindstorm Presentations. Last summer, Kristin served in a 12 week manufacturing technician internship at Intel Corporation.

### Adaptive Technology for People with Limitations: Discover Various Technologies for People with Limitations

This workshop will highlight the latest breakthroughs in technologies for visually impaired people including: The LapTalk screenless laptop computer, the Jordy wearable CCTV, the Nokia cell phone/PDA with TALX software. It will also provide information about accessible distance learning programs.

Presenter Information: Jim Misener is the owner and president of Beyond Sight. He started the business 17 years ago when he, as a blind person himself, recognized the need for a "one-stop shopping" facility for products for the blind and visually impaired. Jim's business acumen coupled with his first-hand knowledge of blindness helped him grow Beyond Sight into the nation's largest and most well respected retail outlets for vision-related products. Jim's most recent contribution to the field of blindness is the

“LapTalk,” a screenless talking computer for blind people. LapTalk combines the power of a PC with the convenience of a notetaker.

Robert Leblond has been in Colorado for two years and is the assistant manager at Beyond Sight. Prior to this, Robert was the owner of “Perspectives,” a firm that specialized in computer products for the blind in Portland, Maine. Robert also has some first hand experience with blindness, as his wife and two children are blind. Robert is a Microsoft Certified trainer and has been in the adaptive technology field for over 14 years. His duties at Beyond Sight include coordination of training services, administering the website, and performing jobsite evaluations for clients. His writings on technology have appeared in both local and national publications.

### **Inside Computers: Scavenger Hunt**

Students will search for various computer components such as motors, switches and chips as they take apart and look inside electrical and electronics equipment.

Presenter Information: Kelly Marie Corwin works for the Women’s Foundation of Colorado, where she manages the Development Database and cultivates personal relationships with donors and prospective donors. Prior to the Women’s Foundation, Kelly Marie worked as the Membership Manager at the Women of the West Museum and Auction Assistant at the Rocky Mountain PBS/KRMA station in Denver. Kelly Marie’s undergraduate degree is in Theatre and Art with a focus on Costume Design and Technology.

Linn Stanley is the former Technology Specialist of the Women's Foundation of Colorado. Although she studied international economics, Linn had an affinity for computers and was increasingly drawn to work in that field. Linn has been an advocate for getting more women and girls into the technology industry and has written articles and reports on the subject. She is currently teaching herself computer graphic design.

### **Tracking Meteors**

Through a series of interactive experiences, students will explore how the Denver Museum of Nature & Sciences’ All Sky program collects data on meteors.

Presenter Information: Gianna Sullivan coordinates special programs for the Denver Museum of Nature & Science Outreach Dept. Currently, she is managing All Sky, a meteor tracking program; Radius, a paleontology program; and traveling around the state conducting focus groups with teenage girls collecting their opinions on science. Gianna holds a BA in Anthropology and an MS in Museum Education.

### **Website Design and Development, it’s NOT Rocket Science**

The session will start with a discussion of what a website is and an overview of the technology that allows a website to appear on one’s computer. Following that, students will build a simple web page using Netscape Composer. One of the wonderful things about Web Development is that students can learn it on their own (on the Web). It is NOT Rocket Science.

Presenter Information: Marjorie Alexander became captivated by the Internet in 1993. Using a slow modem and an old browser, she began downloading and deconstructing websites to teach herself the technology. Over the past 10 years, as the technology of Web Development progressed, Marjorie continued to teach herself how to use numerous software programs in order to build sophisticated web applications for many high-profile clients. Today, Marjorie is the Principal and Lead Web Developer for Two Hundred, a design firm specializing in websites for transportation-related projects.

### **The Visible Human Project - Exploring the Future of Virtual Anatomy**

This workshop will include a short video on the history of the Visible Human Project. It will describe the latest innovations with surgical simulators, interactive programs for learning and teaching anatomy, and future possibilities. Participants will then dissect through a virtual cadaver on a computer, as well as create anatomical animations. Participants will receive our latest anatomical animation flipbooks.

Presenter Information: Lee Granas - Lee is a Colorado native. She got her start with the Visible Human Project back when she was a sophomore in high school. She began by helping to label the anatomical slices. Later Lee attended the University of Colorado at Boulder on the Boettcher Scholarship and studied biology and computer science. She returned each summer to work as an intern for the project, learning more about computers and helping put together the first Visible Human Dissector program. Lee graduated from CU in December of 2001 and has been helping out with the Project ever since.

Michelle Bagur - Michelle received a Bachelor's of Science in Computer Science from the University of Texas at Dallas and is currently working on a Masters in Integrated Science at the University of Colorado-Denver, focusing on Computer Science and Biology. Michelle began programming in the games industry in Dallas, working on PC and N64 systems. She now works as a programmer for the Center for Human Simulation.

### **Intelligent Transportation in Colorado**

This workshop will provide an overview of Intelligent Transportation and the future of Transportation in Colorado.

Presenter Information: Rod Mead is a former radio personality turned spokesperson for the Colorado Department of Transportation. He has worked with the Colorado Transportation Management Center for 10 years and has diverse experience in the field, including Public Relations, closed circuit television, low power radio stations and traffic counters.

She is a strong supporter of Women in Technology, because she knows first hand how much the female students enjoy the technology classes and how well they can do the class work.

## **Patents, Law and Technology**

This workshop will include a series of interactive exercises to demonstrate various scientific principles and legal theories. It will also high-light some of the basic concepts of the science called "Biotechnology."

Presenter Information: Jennifer M. McCallum Ph.D. Esq. is an attorney who focuses primarily on biotechnology clients in a wide variety of areas including agricultural biotechnology, pharmaceutical chemistry, genetic engineering, medical diagnostics, genomics and proteomics. Jennifer counsels clients in U.S. and foreign patent prosecution matters, patentability searches and opinions, and infringement analysis, as well as transactional matters such as technology transfer and licensing agreements.

Katheryn Jarvis Coggon is an attorney with Holme Roberts & Owen LLP. She practices primarily in the areas of intellectual property and environmental law. Before joining the firm, Katheryn worked for the Colorado Department of Public Health and Environment, Air Pollution Control Division. Katheryn comes to the practice of law with experience in nuclear engineering. She led her college design team to national victory in the 1990 American Nuclear Society design contest for a beta/gamma field survey instrument.

## **Buzzers, Lights, and Motors: A Hands-On Introduction to Electricity and Electric Circuits**

Explore a variety of electronic components: lights, buzzers, motors, switches, and more. Build your own fun circuit from these components. Learn how to create and read circuit diagrams.

Presenter Information: Molly Johnson earned her Ph.D. in electrical and computer engineering. She taught university physics and electrical engineering for a number of years, and currently works in the semiconductor industry at Agilent Technologies. In 1997 Dr. Johnson co-developed a summer course for middle and high school girls called "Geek Chic: Gaining Electrical Engineering Knowledge through Collaborative Hands-on Instruction and Computing." The course is still taught in Oregon and Northern Colorado.

## **Rockets' Red Glare**

Have you ever wondered how a rocket is produced and launched? During this hands-on workshop, students will explore the various stages of rockets, three types of satellites (spy, communication and planetary probes), and the orbits in which satellites can be placed. Students will also get to build and launch their very own rocket! Prizes will be given to the rocket that flies the farthest. Students will also be able to sign a Centaur panel, which will be launched into space in 2003 on one of Lockheed Martin's Atlas V launch vehicles. Can you imagine, your name being launched into space? Far-out, indeed!

Presenter Information: Ms. Laryssa Sharvan-Densmore is an executive at Lockheed Martin Corporation serving as the Final Assembly Building and Factory Operations

Manager overseeing the production of the Atlas II, III, and V Booster Rockets in Denver. Previously, Ms. Sharvan-Densmore had served as the First American Launch Operations Manager in Baikonur, Kazakhstan supporting the Proton Rocket program for a three-year duration. She was the first female Launch Operations Manager in the United States, and the first American female to set foot on the Russian launch pads in Baikonur. Ms. Sharvan-Densmore holds a Bachelors of Science in Mechanical Engineering from the University of Rochester (1983) and an Executive M.B.A. from the University of Colorado.

### **Behind the Camera: Exploring Filmmaking From a Female Perspective**

An overview of the behind-the-camera opportunities for women in the film and video production industry.

Presenter Information: Tamara Smith Roldan began her career in video production in the year 2000, working as a freelance producer for Denver Center Media. There she assisted in the pre-production of the documentary “No Bigger Than A Minute,” which is currently in production, produced a 30-minute training video for the National Multiple Sclerosis Society, and assisted in research and production of various other projects. Also in 2000, Tamara opened her own video production company, Now Picture This...! Productions, where she acts as executive producer, writer, editor and videographer. The company specializes in producing Video Memory Books for consumers and Video Yearbooks for local area schools.

In August 2001, she began working at Starz Encore Group, the nation’s largest cable television carrier of premium movie channels. Promoted to Associate Producer in 2002, Tamara produces – for national air – commercials and long-form programming promoting the various movie channel packages the company offers.

### **Adventures in Space: Ask an Astronaut**

Have you ever wondered how astronauts accomplish everyday tasks in zero gravity? Well, here’s your chance to ask a real astronaut all about his experiences in space. Lockheed Martin’s own Mike Coats will present a video illustrating life on the space shuttle and discuss with students the changes that happen to your body in space, the types of food on the shuttle and more. Mike will answer questions that students have about space exploration.

Presenter Information: Michael L. Coats is the Vice President of Advanced Space Transportation for Lockheed Martin Space & Strategic Missiles, leading Lockheed Martin's effort to develop the next generation of Reusable Space Launch and Crew Transfer Vehicles. Coats previously served as Vice President of Civil Space Programs with responsibilities for several programs including: the Hubble Space Telescope, Space Infrared Telescope Facility, major portions of the International Space Station, Earth Observing System AM-1, Landsat 7, Television Infrared Observation Satellite and Lunar Prospector. From 1979-1991, Coats served as an astronaut piloting the 1984 STS-41D Shuttle flight and served as spacecraft commander of STS-29 in 1989 and STS-39 in 1991. Coats earned a Bachelor of Science degree in Engineering from the U.S. Naval Academy and Master’s degrees in Administration of Science and

Technology from George Washington University and in Aeronautical Engineering from the U.S. Naval Postgraduate School.

### **HerWorld: Technology Careers & Women**

Female students are now taking as many upper-level math and science courses as their male counterparts, yet they will represent a minority in high school computer classes. And while women make up nearly half of the workforce, they hold less than 1/3 of technology-related jobs – the jobs with the greatest opportunity for growth and benefits. This workshop assists young women and educators in learning about the opportunities a career in technology has to offer. During this multi-media workshop, participants will discover the “Top 10 Reasons Young Women Should Consider a Career in Technology”. In addition, participants will learn about the following: technology - savvy women – past and present; how women can benefit from technology careers through high compensation, flexible work schedules and telecommuting; and that virtually every career field – from fashion to healthcare – requires technology skills.

Presenter Information: Shari Meisel is native-born from Durango and grew up in Canada. She relocated in 2000 to Colorado and has been actively involved in technology and education. Shari has never considered herself to be a techie, yet her career in business development and marketing has been saturated in technology. Shari is a believer in life-long learning and says that women stand to gain the most from the technology industry. That’s why Shari works with high school students and educators in promoting opportunities and careers in technology.

Charlene Olszonowicz is a professor for DeVry University. She has been teaching for over 6 years. Charlene has a Masters Degree and teaches Information Technology.

### **The FUNdamentals of Science**

**Program a Robot:** Programming teams will write instructions to guide a robot through the activities of creating a peanut butter and jelly sandwich. This exercise teaches the girls the importance of reviewing requirements fully and coding every step necessary to fulfill these requirements. It relates this exercise with the importance and scale of work necessary to write programs that command and control our weather satellites.

**Static Electricity Effects:** Teams will investigate the effects of static electricity on adhesive tape. The girls will learn a quick course in creating hypothesis and performing experiments to confirm them.

Presenter Information: Mary Jean Cardinale is a Senior Quality Engineer for the Raytheon Company working as the IDPS QA Lead for the National Polar-Orbiting Operational Environmental Satellite System (NPOESS) Project. The purpose of the NPOESS System is to collect global multispectral radiometry and other specialized meteorological, oceanographic, and solar – geophysical data, and to disseminate this data to the system’s central users and field users deployed worldwide.