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Spring Job Shadow highlights

Wednesday, March 24th juniors and seniors from area high schools shadowed professionals from Wright-Patterson Air Force Base during the Spring Job Shadow Day.

After successfully registering for the day, each student selected their top three choices from a list of the following career fields:

Acquisitions, Aeronautical Engineering, Computer Engineering, Finance, Fire Fighting, Mechanical Engineering, Medical, Meteorology, Physics, Public Affairs, STEM, and Tax Preparation.

The Job Shadow experience began at the National United States Air Force Museum. The students paired with their mentors and were transported to the base. They then spent the day at Wright-Patterson Air Force Base.

Each mentor provided a unique on-the-job experience for their mentees. Several groups toured the area labs, while others viewed the Presidential Hanger at the Air Force Museum. We even had students extinguishing fires during training exercises.

The Air Force Research Laboratory's Micro Air Vehicles (MAV) lab hosted groups, demonstrating the future of miniature air vehicles. Astounded students asked insightful questions of the engineers.

Additional information about these tiny flying machines can be found at Lab TV, Season One—Robotic Birds pt. 2.

The Aeronautical/Computer Engineering group could be found on the C-5 flight line, visiting the Aero Club, lunching at the Officer's Club, watching MAV's in action and on top on the Sensors Laboratory admiring the panoramic views.

Roughly at 2:30, mentors returned the students to the USAF Museum. The students were encouraged to complete the on-line survey evaluating their day.

Comments included:

"highlights from my day was the MAV or the small hummingbird security cameras. I found the overall process of developing the technology very interesting."

"I really enjoyed seeing all of the aircraft and going into the C5 airplane. I want to become a pilot, so it was amazing to see the planes I will hopefully be flying in the future!"

The next WPAFB Job Shadow is scheduled for October 24. Registration will open the last week in August for those juniors and seniors interested in applying. Watch our website:

<http://edoutreach.wpafb.af.mil>

See page three for a related student article...



Job Shadow Participants enjoying the view on top the radar tower in Area B. The 360 degree vantage point offers stellar views!

Special points of interest:

- Looking for a GREAT resource? Tune into LabTV
- GPS Demos ready for scheduling in August
- Summer Workshop for teachers
- Next Newsletter—September 1, 2010



"It was a lot of fun. If I had a choice to do it all over again the same way, I would. Thanks."



Wizard Spotlight— Rita Peterson

As the WOW! Program Manager, I have the good fortune of working with the brightest and most talented men and women here at Wright-Patterson. Working with my team of wizards, scheduling their classroom visits and seeing the wizards in action is a true treat! Most importantly, I value the personal information they willingly share. Spotting a wizard is just that, “a sneak peak” into the brilliant minds that are passionate about science education. Rita Peterson is no exception. She wears two hats—as our Chemistry and Laser and Optics Wizard. She graciously volunteers for many of the classrooms demos, as well as TechFest, Science Fairs, and Science Night requests. When I asked several spotlight questions, Rita’s replies reflect why she was chosen to be highlighted.

frills—probably would not meet today’s expectations for classroom showmanship and engagement—but the subject quickly revealed its own appeal, and he helped me on the path to learning it. I think I just responded to the challenge, and to his unspoken expectation that I could meet it.

For me, the draw of physics has been the opportunity to understand things at a very basic level. As an experimentalist I can see abstract concepts in action on the lab table. I can not only wonder, “what if”, but can actually try it and see what happens. To this day, I find there is nothing like the thrill of solving a technical problem, something I first came to appreciate in my old high school physics class..”



Can you explain the importance of education and the process of discovery?

“I could write essays on this. I see the main purpose of education as enabling each student to reach his or her potential. Given the natural distribution of talents and interests in the population, this should also provide capable people in diverse fields to meet society’s needs. In other words, addressing the first goal will meet the second. The problem with science, math, and other technical fields seems to be twofold. (1) We are not making it possible for the inherent appeal of these fields to come across to many of the students who might enjoy and do well in them. (2) We do not understand the critical importance of every student attaining some basic level of understanding in these fields.

Neither problem is helped by the frequent lack of a real discovery process in “traditional” education. Students are told information rather than helped to learn and to experience it for themselves. Life itself, however, is ultimately a “discovery process” and students who learn to navigate and to make the most of these opportunities have gained a valuable skill. This is one reason I encourage students to do science fair projects even if they do not have much interest in science; they build skills that

apply broadly to life.”

I have had the pleasure of watching Rita in action. During the latest TechFest she was demonstrating liquid crystals, and due to the increasingly warm environment of Ponitz Hall, the liquid crystal sheets were behaving atypically. Armed with a cup of ice cubes and some cool water, Rita created her own set of experiments to assess the problem. All this experimentation took place under the watchful eyes of a student volunteer who was drawn in by her enthusiasm and excitement for all things science. These experiments quickly led to conversations regarding a variety of subjects, including his future college plans. Watching Rita and this high school junior interact, demonstrated to me what a wonderful mentor/role model this brilliant woman is to students—both young and old.

The Wizards of Wright Program is most fortunate to have such a dedicated individual to call its own.



What inspired you to pursue your current field?

“My path into science was long, convoluted, and probably atypical, largely because I did not know anyone in technical fields when I was growing up. I have always had a questioning and analytical mindset, but I think what initially attracted me to physics was my high school physics class.

My physics teacher was a former professional engineer. He was very direct, no

Wiz Stuff—Wizards and Toys, oh my!

Back by popular demand, Jim Solomon WOW!’s atmospheric wizard returns to the demo circuit. Infamous for his low pressure demonstrations, Jim travels the country sharing his passion of air vacuum science (AVS) with teachers and students alike.

The WPAFB EO Office welcomes Jim’s “The Air We Breathe” back to our demo line up. Designed for grades 3-6 Jim’s one hour program looks at the atmosphere and atmospheric pressure. Equipped with a vacuum pump and other cool gadgets, this wizard encourages stu-

dents to think about our surrounding sea of air. Jim’s high school program explores the same concepts, but in greater detail, emphasizing the gas laws. Those teachers interested in scheduling

- “The Air We Breathe” contact Krista at WPAFB EO.



GPS Units have recently arrived to the WOW! toy chest. Preparations are under way to make this demo available in August. With 16 Garmin eTrex HC series to share, the WOW! wizards can accommodate a class of 30 students. Plans include using the GPS units for not only for basic navigational applications but for creating land profiles and topography.

We currently have volunteers fielding testing our GPS units - exploring all the wonderful things this small piece of hand-held technology can do!

WPAFB Job Shadow Day—Noel Ragland

Five Greenview High School students, Lewis Sandoval, Noel Ragland, Faraan Qureshi, Rachel Walters, and Jennifer Benson, participated in the WPAFB Job Shadow Day on Wednesday, March 24, 2010. The following is a first hand report from Noel Ragland who attended the Aero Program.

“Our first stop on the trip was at the Aero Club, a private pilots club on base, where we learned about the career field of aircraft maintenance from an experienced flyer who had flown 130 combat missions and had logged 3, 500 hours of flight time. He showed us around the flight line while sharing the basics of the career at hand. All of his knowledge could fill up the C-5 which we also toured later. We were able to stand next to the monstrous C-5 Galaxy cargo plane. At the height of the tail, the giant stood at nearly 5-7 stories high. Dwarfed by its size on the outside, the inside was just as impressive. We visited both levels with

the engineer, the pilot and co-pilot on board. Sitting in the pilot seats alone was invigorating. Fun fact, the C-5 can hold two M1 Abrams tanks and load up to 25,844,746 ping pong balls. The next couple of sights we saw made us look to the sky to make sure our tour guides were telling the truth about the technology not being so advanced yet. The MAV lab was loaded with ideas of how to make surveillance systems smaller and even deadlier. If that wasn't a little freaky, the laser systems tower definitely was. Almost every room in the building was only accessible



Noel Ragland is a student at Greenview High School, and an Aero Engineer participant.

through key or even combination and surrounded by cameras. The operations involved electronic and satellite surveillance. Using radar to see people and objects along with aerial monitoring of large areas with apps to see with incredible detail where footsteps have disturbed the grass, all from looking down thousands of feet from the air. All in all, the tour was really fun and interesting to see what

the United States Air Force is working on next and provided great insight to possible careers.” - Noel Ragland

What's New? - SUMMER TEACHER WORKSHOP June 21-22, 2010

Join WPAFB Educational Outreach and the Akron Global Polymer Academy at

the AGPA and WPAFB Science and Technology Summer Institute. Scheduled for June 21-22, the two day workshop will be jammed packed with exciting and practical resources to use in your classrooms.

“the two day workshop will be jammed packed with exciting and practical resources”...

This year's theme is “Plastics and Solid Waste Disposal”. Specifically designed for the 4th-8th grade school teacher, educators from Akron University and Ohio Department of Natural Resources will share hands-on, minds-on activities focusing on the scientific method, the engineering design process, and problem solving.

Workshop partici-

pants will have the opportunity to tour the WPAFB Recycling Center. The facility is home to millions of worms, glass mulch production, plastics recapturing, ceiling tile recycling, along with paper, cardboard, and aluminum recycling.

Workshop details and registration forms are available on the WPAFB Educational Outreach website:

<http://edoutreach.wpaafb.af.mil>

Workshop is limited to 25 participates,

Carbon Nanopearls — “Cooking Up Tomorrow's TV Technology”

An exciting way to introduce the field of Nanotechnology, this LabTV webisode highlights the Air Force Research Lab work on Carbon Nanopearls.

Reviewing the microscopic size of nano—one billionth of a meter— this snippet features a WPAFB materials engineer and her work with nanopearls.

Hoping to create uses for this ultra strong, great conductor of electricity, the carbon nanopearl technology may

just replace television screens of today. The FED (field emission display) screens could shrink the size of the current plasma and LCD screens used on today's television models to less than an half in inch. Imagine that...

For those high school chemistry classrooms, this webisode illustrates the process in which the nanopearls' crystalline structure is formed with the use of acetylene and a nickel catalysis.

The webisode can be viewed at:

www.ndep.us/LabTV

click on Season One—Carbon Nanopearls.

Next newsletter—On My Wavelength.



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Our Mission: To facilitate partnerships with the K-12 educational community to increase student awareness and excitement in all areas of science, technology, engineering and math (STEM) and related careers!

Wright-Patterson Air Force Base, near Dayton, Ohio is one the nation's most important military installations. The base is headquarters for a vast, worldwide logistics system and is the foremost research and development center in the U.S. Air Force. Steeped in tradition, WPAFB has been a leader in military aviation development from the time of airplane inventors Wilbur and Orville Wright, who lived in Dayton, to today's aerospace age.

The Wright-Patterson AFB Educational Outreach Office was established in 1999 to share the base history, experience and capabilities with the K-12 educational community through internal programs, partnerships and individual involvement.

It is the only program of its kind within the Department of Defense!

D.I.Y (do it yourself) Science— Krista Gerhardt

As a workshop junkie, I have been to more than my fair share of workshops. Years ago, I went to a workshop that included COSI's *Gadget Works*. *Gadget Works* is a distance learning program where the students learn about simple machines and their many uses. By taking apart wind-up toys, the students are then challenged to invent their own wind-up toy. This is where I was first introduced to the "Happy Crab".

Like many workshops I attended, I often modified the content to fit my 8th grade classroom's needs. Losing the focus of simple machines and focusing more on force and motion, I quickly turned this into an introductory lesson for our *World in Motion* unit. During *WIM* the students are challenged to design, build, and market a gear-driven toy. By starting with this "crab dissection", students observe the gear box and mechanisms needed to put this happy crab in motion—tracing the energy flow through the wind-up toy. My modified lesson, aligned with the Ohio Academic Content Standards for Physical Science, Science and Technology, Scientific Inquiry, and Scientific Ways of Knowing.

Starting with a stopwatch, student teams collect data on the crab's movement. Observing the start-

ing and stopping point of the wind-up knob and the distance traveled over time. Upon dissection of the crab, the students then discover the gear box and simplicity of efficient design. Copious notes aid the students in putting the toy back together again. Other than replacing small screws that hold the back shell, these Happy Crab are tough little toys. I have used my crabs for 5 classes of eighth graders for 7

consecutive years!

Sharing the highlights of my Happy Crab lesson with our resident engineer, Bob Gemin, he quickly referenced places to purchase.

<http://www.amazon.com/Toysmith-Giant-Crab-Wind-Up/dp/B003D7ADC2>

<http://www.kleargear.com/1996.html>

The appearance of these hyperlinks does not constitute or imply endorsement by the U.S. Air Force



The Happy Crab!

Initially, I purchased my toys from COSI. Sixty dollars got me 8 happy crabs, 8 chattering teeth (too small to use), 8 screwdrivers and 8 part trays. Bob also referenced related articles on "reverse engineering" and "mechanical dissection" all popular teaching practices in engineering schools today.

So, what can I say, there's a lot to be learned through the kinesthetics of touching stuff...my 8th graders proved it!

Next issue: Cow Eyes