2007 SURF Summer Seminars and Tours

May 29 First official work day and orientation for SURF Session I students

May 31 NIST General Safety Orientation for Summer Students

The session provided an overview, including how to report emergencies, use of personal protective equipment, general safety, office ergonomics, laboratory safety, and radiation safety. A session was also given on June 14 for Session II SURF students.

May 31 Brian Weiss and Craig Schlenoff
NIST Manufacturing Engineering Laboratory, Intelligent Systems Division

Advanced Soldier Sensor Information Systems and Technology (ASSIST)

The DARPA-funded Advanced Soldier Sensor Information Systems and Technology (ASSIST) project is aimed at developing soldier-worn sensors to increase a soldier's battlefield awareness during humanitarian and combat missions, provide them with data collection tools to augment their mission reporting capabilities following their field operations, and supply additional information to intelligence officers to enhance planning for future missions. ASSIST is separated into two tasks: Task 1 focuses on the hardware and Task 2 focuses on the software. NIST's role in this program is to develop and implement evaluation procedures to characterize the performance of the software components developed under Task 2. This presentation provides an overview of the ASSIST program, a description of the technology being evaluated, and the evaluation procedures in which NIST is employed. In particular, we will describe the details of the two evaluations that were performed over the past year and describe the plans for the evaluation that will take place in June 2007 at the Aberdeen Test Center. This upcoming evaluation will involve evaluating a face detection system and a soldier movement characterization system in a simulated Iraqi village.

June 7 Joannie Chin
NIST Building and Fire Research Laboratory, Materials & Construction Research Division

Broken Fibers, Broken Trust: The Materials Science of Body Armor

In 2003, a police officer was shot and seriously injured when a bullet penetrated his body armor, which was less than 6 months old at the time of the shooting. This event drew the attention of government, fiber and armor manufacturers, and the law enforcement community to issues relating to body armor durability and service life. This talk will provide an overview of materials used in body armor and body armor testing, and provide highlights of NIST research on ballistic fiber degradation.

June 11 First official work day and orientation for SURF Session II students.

June 12 Dr. Steve Banovic
NIST Materials Science & Engineering Laboratory, Metallurgy Division

Tour Stop: Metallurgical Studies on World Trade Center (WTC) Steel

Steve gave several tours throughout the summer in order for all interested SURF students to learn of this important NIST research.

In response to the events occurring on September 11, 2001, NIST conducted a 3 year, $16M investigation of the World Trade Center disaster. The main goal of the Metallurgy Division during this study was to characterize the microstructure and mechanical properties, failure modes, and temperature excursions seen by the steel. The information obtained was used as inputs to the models simulating the behavior of each tower on that day. Steve's talk first described the construction of the towers and then focused on the recovery and identification of critical structural steel elements.

It was chilling to see the actual steel removed from the wreckage of the WTC.

June 13 ***NIST Virtual Library (NVL) Demo and Research Library Tour***

The session introduced the students to the major information resources available and used by NIST researchers: NIST virtual Library, Technical Databases, E-Journal Collection, Special Collections on Selected Topics, Document Delivery Services, and the Library Website and Functions.

June 13 ***ASSIST Field Test Opportunity***

All interested SURF students were given the opportunity to participate in a one-day Intelligent Systems Division-led field evaluation of soldier-worn sensor technologies at the Aberdeen Proving Grounds in Aberdeen, MD. This evaluation will entail evaluating sensor technology that will help soldiers in the field better collect data and allow them to gain greater understanding of the environment.

SURF students were sought to play the part of "actors" within the test environment throughout the evaluation. Roles included interacting with soldiers during the testing within the Aberdeen Test Center's (ATC) Military Operations in Urban Terrain (MOUT) site. In addition to the military test experience on base, the students also learned about cutting edge technologies by seeing them in action, first-hand.

June 14 Dr. Dean Eppler
NASA Johnson Space Center, SAIC Exploration Office, Houston, TX

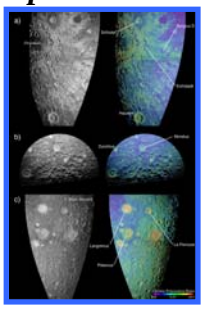
Space Suits and Meteorites

Dr. Dean Eppler is a field geologist by training and has become a space suit test subject (AKA crash-test dummy) by accident. Over the last 10 years, his geologic

field experience has been utilized by NASA to test a variety of prototype space suits and hardware in order to develop the future spaces suit systems that will ultimately be used on the Moon and Mars. This work has led him to such diverse locations as the Arizona desert, the Canadian arctic, and the Antarctic Polar Plateau, testing space suits, rovers, evaluating instrument deployment, developing a feel for exploration logistics, and cruising the blue ice of the Polar Plateau looking for meteorites. Dr. Eppler's talk will discuss these experiences and the twist and turns in his career that led him to the inside of a space suit and back of a snowmobile in Antarctica.

June 21 Dr. Rebecca Ghent (former SURF student)
University of Toronto, Department of Geology

Shooting the Moon: Using Earth-Based Radar for Remote Lunar Exploration



Earth-based radar observations provide a powerful tool for exploration of the lunar surface and regolith. In this talk, we will discover how radar imaging has been used to study the Moon's history of impact cratering and explosive volcanism. We will also discuss new, high-resolution observations that allow us to investigate the Moon's in situ resource potential, an important aspect of planning for future manned lunar exploration.

Rebecca earned her bachelor's degree in Physics in 1993 from Randolph-Macon Woman's College, and participated in the very first NIST SURF program during the summer of 1993, working with Dr. peter Mohr. She went on to Georgia Tech, where she earned a Master's degree in Physics in 1994. She then taught Physics at Gordon College in Georgia for one year, before returning to graduate school to study geology. She graduated from SMU with a Ph.D. in geology in 2002. She held a postdoctoral fellowship at the Smithsonian Institution in DC in 2006, when she traveled to the Great White North to become an assistant professor of geology at the University of Toronto.

June 25 Professor Bruce Maxwell
Swarthmore College

Designing Robots to Interact with People

Over the past 10 years we have designed robots to serve hors d'oeuvres, give

people information about conference talks, provide fashion commentary, and search for victims in urban search and rescue scenarios. Despite the different nature of each task, common design themes appear in each scenario, and we have discovered some interesting things about human-robot interaction. This talk will present some of the highlights and failures and what we learned from each.

June 28 Dr. Joe Nickell
Center for Inquiry, Amherst, NY

Investigating the Paranormal: Lessons in Critical Thinking

Joe Nickell, Ph.D. – a former stage magician and private detective, and now perhaps the world's only full-time professional paranormal investigator – explores the fringes of science. In this wide-ranging, slide-illustrated presentation, he looks at hauntings, alien visitations, the ancient Nasca lines, cases of "spontaneous human combustion," and other examples of the world's strangest mysteries. Nickell argues that such "Real-Life X-Files" (the title of one of his many books) should neither be fostered nor dismissed out of hand. Rather, they should be carefully investigated using the same principles that would apply to a murder mystery.

July 5 Dr. MarkWozar
NIST Information Technology Laboratory, Software Diagnostics and Conformance Testing Division

Computer Forensics

Digital forensics, the recovery of data to be used as evidence in both devil and criminal legal proceedings, or in internal investigations documenting violations of computer usage policies in corporate or public agency settings, continues to integrate into our culture. My seminar highlights some recent high profile crimes where digital forensics was used, suggested digital devices from which computer crime investigators might recover data provides an overview of NIST's role in digital forensics, and shows a snapshot of current employment opportunities in digital forensics.

July 12 John Kasianowicz
NIST Electronics & Electrical Engineering Laboratory, Semiconductor Electronics Division

DNA Transport through Nanometer-Scale Pores: In Search of the Holey Grail

Protein ion channels (i.e., nanometer-scale pores that span cell walls) are the molecular basis for many biological processes including nerve activity, muscle contraction, and the trafficking of macromolecules into and out of cells. Recent laboratory studies suggested that these anopores might also prove useful for real-world applications such as ultrafast DNA sequencing and the high-throughput screening of therapeutic agents against lethal anthrax toxins.

We will discuss how simple electronic measurements provide physical and chemical information about single nanopores and how further advances in materials engineering, theory, and signal processing could enable practical applications based on biological or solid-state nanopores.

July 12 ***Annual Summer Horizons Program***
Lisa Portis Morgan, Ph.D.
Events Coordinator
The Graduate School
University of Maryland Baltimore County

SUMMERHORIZONS

SURF students were invited to attend the annual Summer Horizons program at the University of Maryland, Baltimore County (UMBC). Summer Horizons presented a one-day introduction to Graduate School. The day included sessions on the benefits of a graduate degree, the application process, fellowship opportunities, an

introduction to graduate programs at UMBC, laboratory/department tours, and a motivational speech by UMBC's President, Dr. Freeman Hrabowski.

Another important part of the program: a continental breakfast, hot buffet lunch, and afternoon snacks were provided *free* of charge.

July 19 Dr. Steven R. Ray
NIST Manufacturing Engineering Laboratory, Manufacturing Systems Integration Division

Giving Successful Technical Presentations

This talk will cover some tips and techniques accumulated over three decades of delivering technical talks. This is not a structured course in how to prepare a technical talk, but will instead recount some specific ideas I was exposed to that helped me make my presentations more compelling. They may work for you as well.

July 23 **Visit by University of Maryland Materials Research REU Program**

Sixteen students from the University of Maryland REU program (similar to our SURF program) toured a number of labs (metallurgical studies on WTC steel, retroreflective control devices, and learning applied to ground robots) to learn of the research happening at NIST.

July 24 **Free Pizza Lunch and University of Maryland Graduate Studies Overview**

Dr. William Phillips, Nobel Laureate
NIST Physics Laboratory & Univ. MD Distinguished Professor

Here's a two-fold offer you can't pass up – a chance to meet Nobel Laureate Bill Phillips and get free pizza.

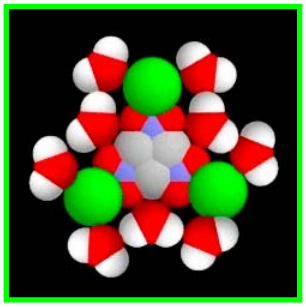
SURF students were invited to a free pizza lunch and an overview of graduate research opportunities at the University of Maryland. Among the featured speakers was the Deputy Chair of Maryland's Physics Department, the Director of the Chemical Physics Program, and the NIST and Maryland and NIST co-directors of the new Joint Quantum Institute.

Scientists from the University and NIST gave an introduction to graduate study opportunities in biophysics, physics, chemical physics, materials, and related

areas. There was an opportunity for questions and informal discussions after the presentations.

July 26 Dr. Greg Gillen
NIST Chemical Science & Technology Laboratory, Surface and Microanalysis Science Division

The Science of Trace Explosive Detection



In collaboration with the Transportation Security Administration's Trace Explosive Detection Group, the NIST Surface and Microanalysis Science Division has been working to build a chemical metrology program to support the widespread operational deployment and effective utilization of trace explosives detection devices throughout the United States. A second objective of this program is to develop at NIST the specialized measurement expertise that will be needed to support the next generation of explosive detection equipment. The low volatility of most high explosives makes direct analysis of vapors impractical. Therefore, most detection systems are based on either airborne or surface swipe collection of micrometer-sized explosive particles with subsequent thermal vaporization of the particles into an ion mobility spectrometer for identification. The effective collection and thermal desorption of the explosive particles is the critical front-end process for the successful and reproducible detection of explosives. Using funding from the NIST Office of Law Enforcement Standards and the Department of Homeland Security, we are leveraging existing expertise in particle analysis, analytical chemistry and chemical microscopy to study the explosives collection and detection process in detail. This information is being used to help facilitate the continued development, characterization, calibration and standardization of both tabletop and portal trace explosive detection devices. This presentation will include a discussion of our ongoing research in this area with an emphasis on some of the advance metrology tools being used to characterize individual explosive particles. Finally, some of our recent efforts in preparation of standards for trace explosive detection will be discussed including the use of drop-on-demand ink jet printing of explosives.

August 7 Final presentations by SURF students moderated by invited guests.

August 7 Lunch: SURF Directors and special invited guests.

August 8 Final presentations by SURF students moderated by invited guests.

August 9 Final presentations by SURF students moderated by invited guests.

August 10 Last day for SURF students and farewell pizza party.

2007 SURF Summer Activities

It's always difficult when you're in a new city, with a new job – unless you're a SURF student. NIST Gaithersburg SURFers find themselves in the same boat and thus forge bonds that may last a lifetime. They work together AND play together; they've found the *scientific* formula for balancing the two. In fact, to make life easier they can get it all scheduled using their own forum for social and work-related chatting.

NIST SURF Forum

For NIST SURF-related chat & info (this is not a US Government website)

Before You Arrive

Travel, Living Arrangements & Money
- How to get here, info on roommates, and the all important money

Meet Your Roommates
- Chat with your new suite mates

NIST Research and Other Opportunities

Important Meetings & Dates
- NIST seminars, tours, special meetings, off-campus visits, socials & more

Working at NIST
- Guidelines to the workplace

Please help…
- Solve a problem or find something I need for my project

Complaints
- Post a complaint bout NIST or Summerfield – solutions welcomed!

After NIST
- Graduate school options and other career opportunities

SURF Student Activities

Chat Central
- Off topic chat, forum games and everything else

Outdoor Activities
- Organize hiking, camping, biking trips

Apartment Life
- Organize activities at Summerfield

Sports
- Organize sports activities at or outside of NIST

Take a Trip
- Organize trips to DC, Baltimore, New York, amusement parks & more

Religion
- Find friends of faith

General Category

General Board
- This is the board for general discussions.

Test Zone
- Test the forum out here. Posts made in this board will not add to your post count.

SURF BBQ – NIST Picnic Grove

To kick off the summer and give the students a chance to meet one another, the SURF Directors provide a welcome BBQ with burgers, salads, desserts, and sodas. It doesn't take a "rocket scientist" to know that if food is mentioned you'll find the SURF students there.

Yummm, NIST SURF Directors sure know how to put out a good spread…

SURF Director Chris White (BFRL) and Dan Pierce (CNST) braving a smoky grill to feed a bunch of hungry SURFers. SURF Director Larry Reeker (ITL) at the ready to deliver the goods to the table.

Is that a DC United soccer star – no, just Marcos from UPR working off the burgers and dessert

2007 SURF T-Shirt Design

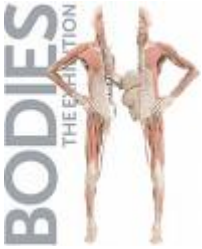
"Tradition simply means that we need to end what began well and continue what is worth continuing." Every year the students design a t-shirt as a souvenir of their summer together. It may not be Billabong or Roy, but check out their SURF wear below.

The proud designers of this year's SURF wear ---

The Washington Metropolitan area is rich in cultural and recreational opportunities. NIST is just a short commute from the nation's capital, theaters, movies, restaurants, historical and cultural sites, museums, shopping, and many local universities. The students didn't have to wait until after work either since NIST has a fitness center, soccer, volleyball, softball, and many other activities to participate in during lunch break. You didn't have to spend a lot of cash to have fun, since there were always movie nights, poker parties, pool parties, basketball games and many other fun activities.

Star Wars Film Festival

A long time ago in a galaxy far, far away… The students housed at Summerfield Suites organized a Star Wars Film Festival. They showed all six movies over a 6-week period.



A group of SURF students (what a lucky guy!) went to "Bodies: The Exhibition" that opened in Washington, DC.

The Exhibition was designed to help you see what a body really looks like on the inside. The Exhibition uses real human bodies that have been preserved so they do not decay. A human specimen is first preserved according to standard mortuary science. The specimen is then dissected to show whatever it is that someone wants to display.

Hiking

The Chesapeake and Ohio National Historical Park includes 19,236 acres paralleling the Potomac River from the densely urbanized Washington D.C. upriver for 184.5 miles through pastoral farm country and forest to Cumberland, Maryland. Many of the park's three million annual visitors come here to enjoy the outdoors, access the river, hike and bike, jog, ride horses, and observe wildlife. The SURFers decided to check it out one warm summer day by hiking the Billy Goat Trail – you can see where the trail got its name.

Celebrating America's Biggest and Best-Loved Birthday Party

Congress established Independence Day as a holiday in 1870 and in 1938 Congress reaffirmed it as holiday, but with full pay for federal employees. Today, communities across the nation mark this major midsummer holiday with parades, fireworks, picnics and the playing of the "Star Spangled Banner" and marches by John Philip Sousa.

The spectacular concert provided an unrivaled evening of patriotic and uplifting music followed by a stunning display of fireworks over the Washington Monument. Capping off the evening was a rousing rendition of Tchaikovsky's "1812 Overture" an audience favorite and a Capitol 4th tradition featuring the U.S. Herald Trumpets and complete with live cannon fire provided by the United States Army Presidential Salute Battery. Where else can you celebrate a holiday with a half million of your nearest and dearest friends – for free!

Rock Climbing

Ken Inn, a Physics Lab SURF Advisor, has taken SURFers rock climbing at Sugar Loaf Mountain for the past several years. Geologically, Sugarloaf is known as a monadnock, a mountain that remains after the erosion of the surrounding land. At SugarLoaf, that process took approximately 14 million years. At an elevation of 1,282 feet, Sugarloaf stands more than 800 feet above the farmland below. The rugged cliffs on the summit are composed primarily of quartzite, the predominant type of rock on the mountain.

SURF Social

It seems that the T-shirt committee was so successful in selling the hottest fashion item of the summer that they had a few extra dollars and splurged on one of the socials held after the weekly seminar talks – let's hear it for entrepreneurs.

Cooling off – SURF style – with water balloons and ice pops

Piñatas – before…

Piñatas – after…

Good Deed

"True happiness comes from the joy of deeds well done…" Get a group of SURFers together, and you never know what they'll do -- organized by word of mouth, they gave blood during the NIST June blood drive.

41st Annual Smithsonian Folk Festival

Several SURFers checked out the sights at the 41st annual Smithsonian Folk Festival held on the National Mall in Washington, DC.

In its forty-first year, the Smithsonian Folklife Festival continues an important tradition by featuring *Roots of Virginia Culture*, *Mekong River: Connecting Cultures*, and *Northern Ireland at the Smithsonian*.

The *Roots of Virginia Culture* program helps mark the 400th anniversary of the founding of Jamestown. Among early immigrants to Virginia were Scots and Irish from Ireland—people who contributed mightily to the new nation. *Northern Ireland at the Smithsonian*, focuses on the cultural life of those "back home." *Mekong River: Connecting Cultures,* which brings together musicians, artisans, cooks, and other cultural exemplars from Cambodia, China, Laos, Thailand, and Vietnam. The program follows the 3,000-mile river from its highland origins on the Tibetan Plateau through the Yunnan Province of China to the delta of southern Vietnam. Many Americans are familiar with the region because of war. But beyond the conflicts are rich, interrelated cultures.

Six Flags Amusement Park

When they're not working hard on their research projects at NIST, fun and SURFers seem to go hand in hand. This time a group went to the nearby Six Flags amusement park.

Fly as high as the Man of Steel on one of the tallest coasters on the East Coast. Standing 205 feet tall, this super-fast, steel hyper-coaster features a mile-long track of hairpin twists and turns. If you've got nerves of steel, take on *Superman: Ride of Steel* --

- Drop a gut-busting 20 stories at high speed
- Throw your hands in the sky as you fly like the Man of Steel.

The ride sounds tailor-made for a group of *college age* SURFers.

Facebook is a **social utility** that **connects you** with the people around you.

From Wikipedia… **Facebook** is a social networking website which was launched on February 4, 2004. Initially the membership was restricted to students of Harvard University. It was subsequently expanded to other Boston area schools (Boston College, Boston University, MIT, and Tufts), Stanford, and all Ivy League schools within two months. Many individual universities were added in rapid succession over the next year. Eventually most US colleges and many Canadian university students with a university (.edu) email address were eligible to join. There was a separate network initiated for US high schools. Since 11 September 2006, it has been made available to any email address user who inputs a certain age range. Users can select to join one or more participating networks, such as a high school, place of employment, or geographic region.
As of July 2007, the website had the largest number of registered users among college-focused sites with over 34 million active members worldwide (also from non-collegiate networks). In July 2007 it was ranked between top 10–13 web sites, and was the number one site for photos in the United States, ahead of public sites such as Flickr, with over 8.5 million photos uploaded daily. It is also the seventh most visited site in the United States.

What better place for a group of SURFers to keep track of each other and continue those friendships developed over their summer at NIST.

Farewell Pizza Party

The SURF Directors provided 50 pizzas (with only ½ pizza left) so all 135 SURF students could fill up one last time, chat about their summer, and exchange email addresses so everyone could keep in touch – where did the summer go! I guess the old adage "time flies when you're having fun is true" if your summer is spent at NIST. There were also 4 big buckets of Rita's Italian Ice for dessert – compliments of the T-Shirt Committee.

Looks like one smart SURFer guy – you can have the pizzas – I'm posing with the ladies.

Just chillin' – juices, sodas, and water – that is

Yumm… pepperoni is my favorite