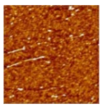
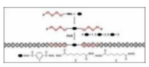
Images within the Report

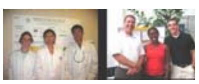
Page 15: The Stark decelerator is used to slow a beam of molecules to controllable velocity with a narrow spread in energy. A typical decelerator is one meter in length with approximately 150 electrode pairs. Each electrode pair generates an electric field of approximately 12 million volts per meter.
Credit: Heather Lewandowski, University of Colorado



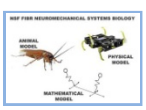
Page 16: Characterization of PCR (standard polymerase chain reaction used to lengthen the DNA segments) results by atomic force microscopy (AFM). The measured length of the stretched DNA is very close to the theoretical calculated value.
Credit: Zhenan Bao, Stanford University



Page 16: Schematic representation of building DOD structures using standard chemical reactions (amide-coupling reaction, followed by the polymerase chain reaction to lengthen the DNA segments). The next stage will involve metallization which is planned to proceed by electrochemical reduction of positively charged metal ions following their adsorbtion on the DNA segments.
Credit: Zhenan Bao, Stanford University



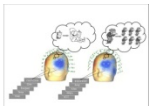
Page 16: Left: Internship undergraduate and high school students. Four graduate students (one female), seven undergraduate students (four female), two community college students (one female and one Hispanic), two high school students, two high school teachers, and two postdoctoral fellows (one female) have worked on research supported by this NSF Award. Right: High school teacher with other students.
Credit: Zhenan Bao, Stanford University



Page 17: The integration of direct experimentation on animal models, mathematical models and physical models, such as robots, allows new insights into how we all move - a hallmark of being an animal.
Credit: Robert Full, University of California – Berkeley

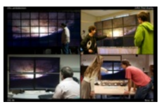
Page 17: Fig 1. Environment for observations of collisions and landings (top left). By attaching a motion capture "suit" to a live insect (top center), we can record all position and orientation data and all derivatives (assuming sufficiently fast capture). For example, a composition of the trajectories following multiple collision events is shown in (top right). Fig 2. Recent version of the Harvard Microrobotic Fly, including power actuators and smaller control actuators. (bottom right and left)
Credit: Robert Wood, Harvard University

Page 18: Giant Humboldt Squid and the unique structure of the beak - one of the hardest and stiffest wholly organic materials known.
Credit: Craig J. Hawker, University of California – Santa Barbara



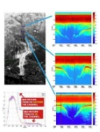
Page 18: The anterior midline field (AMF) of two individuals as they are reading semantically complex expressions, requiring a coercion of a basic meaning into a more complex meaning. The green spots around the head are MEG sensors, which measure changes in magnetic fields caused by electrical activity in the brain. In this figure, two regions of fluctuating magnetic fields are depicted in red and blue.
Credit: Llina Pylkkanen, New York University

Page 20: Children interact with the EcoRaft project, an interactive informal science education exhibit about the science of restoration ecology, built using a richly-connected multi-device system.
Credit: Bill Tomlinson, University of California – Irvine



Page 20: Shown here is a high-resolution Milky Way galaxy animation developed by the National Center for Supercomputing Applications that was simultaneously distributed to multiple sites using SAGE software. The animation was displayed on two different tiled displays at UIC's Electronic Visualization Laboratory (upper left, lower left), on a tiled display at SARA in The Netherlands (upper right), and at Masaryk University in Brno in the Czech Republic (lower right).
Credit: National Center for Supercomputing Applications

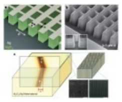
Page 21: Cover of January 22, 2009 Nature highlighting the work published by Steig et al. on Antarctic Warming
Credit: Background Image Credit: Eric Steig, University of Washington and Josefino Comiso, NASA-Goddard; Overall Image Credit: Nature



Page 22: Cross-channel soundings of the Jakobshavn glacier. The image of the channel in the left column (rotated so that north is left) depicts the location of the cross-channel flight echograms shown on the right. A-scope at the bottom left shows that ice in the channel is very lossy.
Credit: S. Prasad Gogineni, University of Kansas

Page 22: Melting Arctic Sea Ice. Observations of ice growth and surface and bottom melt have been made from autonomous ice mass balance buoys (IMB) that drifted with the ice pack. These buoys are equipped with a datalogger, satellite transmitter, barometer, acoustic rangefinders placed above the ice surface and below the ice bottom, and a thermistor string extending from the surface through the snow and ice into the upper ocean. The IMBs provide information on snow accumulation and melt, ice growth and decay, the onset dates of melt and freezeup, and the ocean heat flux. Modeling studies enabled the energy balance calculations.
Credit: Jeremy Harbeck

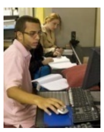
Page 23: Regional study area map of the northern Gulf of Mexico margin depicting the main rivers that flow into the estuaries studied (NU-Nueces River, LA-Lavaca River, TR-Trinity River, SA-Sabine River, CA-Calcasieu River, and MO-Mobile-Tensaw River), isopleths (dashed lines) of mean annual precipitation (in cm), and shelf bathymetry.
Credit: John Anderson, Rice University



Page 24: Two research groups within the NSF-supported Center for Scalable and Integrated Nanomanufacturing at the University of California-Berkeley devised methods for the design of metameterials which bend light. Pictured first is the metamaterial composite of functional layers milled in a fishnet-like pattern (top) and second a metamaterial made with silver nanowires embeded in an alumnia matrix (bottom).
Credit: Xiang Zhang, University of California-Berkeley

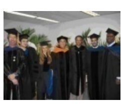
Page 29: Cari Elledge (center, Norman ISD), Donna Goodman (right, Moor ISD), and Mary Ridens (standing, OKC ISD) get ready for another fly climbing test. Stephanie Easter (OU Ungradate) examines her climbing data (top left).
Credit: Bing Zhang, Oklahoma University

Page 29: Stephen Hinkle (Norman ISD) and John Tauber (OU Undergrad) sort fruit flies under the microscope.
Credit: Bing Zhang, taken while science teachers worked at the University of Oklahoma in June 2008

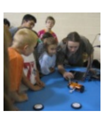


Page 29: Students designing a rollercoaster
Credit: North Carolina State University

Page 30: The force on a dipole experiment couples real-time control of the current entering a Helmholtz coil with a synchronized visualization of the resulting magnetic fields generated by the coil and the suspended magnetic dipole.
Credit: MIT



Page 30: The FIU CREST has graduated 39 PhD students. Pictured here (from left to right) is the Spring 2008 graduating class: CREST Co-PI Xudong He, CREST PhD graduates Wei Peng and Maria Tito, CREST Co-PI Malek Adjouadi, CREST PI Yi Deng, CREST PhD graduate Jose Morales, and CREST Sr. Investigator Peter Clarke.
Credit: Yi Deng, Florida International University



Page 31: Demonstration of robotic GUI interface at a public library
Credit: Jan Pearce, Berea College

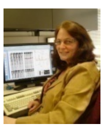
Page 31: (a) Silver nanoparticles (grey) segregated on the surface of the ceramic filter during drying. (b) During their visit to Brazil, students from the University of Pittsburgh conducted water quality tests with the ceramic filters
Credit: Ian Nettleship, University of Pittsburgh

Page 31:Three of the four history making graduates at the University of Mississippi (left to right): Carla Cotwright, Bryan Williams, and Adrian Wilson.
Credit: University of Mississippi

Page 32: Georgia Tech's FACES project (Facilitating Academic Careers in Engineering and Science) funded through the NSF program, Alliances for Graduate Education and the Professoriate (AGEP), works with doctoral students to prepare them for academic careers. Here, Gregory Triplett is hooded at the university's 2004 Ph.D. commencement ceremony. Dr. Triplett is currently Assistant Professor in Electrical Engineering department at the University of Missouri-Columbia.
Credit: Georgia Institute of Technology

Page 32: Dr. Elizabeth Hausler trains builders in developing countries to build earthquake-resistant houses
Credit: Elizabeth Hausler, University of California – Berkeley

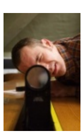
Page 33: Four LCCC Wind Energy Technician Program students prepare for their Wind Tower Climb of a Suzlon wind turbine at the Duke Energy Happy Jack Wind Farm just West of Cheyenne Wyoming.
Credit: Photo by Mitch Maxwell



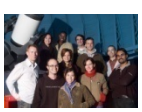
Page 34: Dr. Anne Simon from the University of Maryland - College Park is a key player in redefining how science is communicated to teachers and students. She has represented and advocated science across the boards from television to local public schools.
Credit: Anne Simon, University of Maryland

Page 34: Lisa Gentile and the students in her summer group
Credit: Lisa Gentile, University of Richmond

Page 35: *Three 7th-grade Future Scholar students perform an experiment in particle formation during the first summer program, conducted at Rutgers University in 2008*
Credit: Center for Structured Organic Particulate Systems (C-SOPS), Rutgers University



Page 36: New York City science teacher Thomas Cork of Queens High School for the Sciences eyes up his optics during an activity on telescope design.
Credit: Destry Saul



Page 36: New York City science teacher Thomas Cork of Queens High School for the Sciences eyes up his optics during an activity on telescope design.
Credit: Destry Saul

Page 37: Partnerships in Research and Education (PIRE) student Simone Pasmore, who performed her PIRE research with collaborators at the Universidad Nacional de La Plata, Argentina, presents her research during the PIRE Poster *Session at the Sixth Latin American Grid Summit, October 2008, Florida*
Credit: Dr. Yi Deng, Florida International University (FIU)

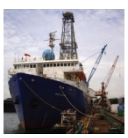
Page 37: PIRE students Jan Mangs, Lina Ortega, Christopher Holder, and Paula Carrillo performed collaborative research at Tsinghua University
Credit: Dr. Yi Deng, FIU

Page 38: Latrice Tatsey of Browning explains the Blackfeet calendar stick to teachers.
Credit: Regina Sievert, Salish Kootenai College

Page 38: Mary Jane Charlo teaches teachers how to make double balls and sticks.
Credit: Regina Sievert, Salish Kootenai College

Page 38: Pat Pierre and Mike Durglo, Sr. and Myrna Adams talk to teachers about cultural issues and traditions, historic and contemporary.
Credit: Regina Sievert, Salish Kootenai College

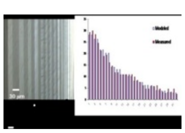
Page 39: Graduate STEM Fellows lead teams in intertidal data collection, Hawaii
Credit: University of Hawaii, Manoa GK12



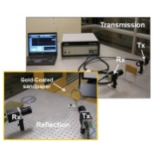
Page 42: JOIDES Resolution at the ship yard in Singapore right before it leaves for sea trials.
Credit: Consortium for Ocean Leadership

Page 42: Image from the Eye-in-the-Sea (EITS) showing a Tanner Crab (*Chionoecetes tanneri*), Slender Sea Pen (*Funiculina sp.)* and Deepsea Sole (*Embassichthyes bathybius*) near the electronic jellyfish, an electronic device that imatates a jellyfish's bioluminescent display to lure large, active predators into view.
Credit: Edie Widder, Harbor Branch Oceanographic Institution, Inc.

Page 43: Deployment of equipment on Mount Erebus on Ross Island, Antartica.
Credit: Philip R. Kyle, Richard C. Aster, Department of Earth and Environmental Science, New Mexico Institute of Mining and Technology



Page 43: The left side shows a high-magnification photograph in an electron microscope across the thickness of a film consisting of 32 individual layers of two different polymers alternating one-by-one. The right side shows a graph of the thicknesses of these layers from left to right and demonstrates the smooth gradation in thickness from layer to layer.
Credit: Professor Anne Hiltner, Case Western Reserve University



Page 44: The left side shows a high-magnification photograph in an electron microscope across the thickness of a film consisting of 32 individual layers of two different polymers alternating one-by-one. The right side shows a graph of the thicknesses of these layers from left to right and demonstrates the smooth gradation in thickness from layer to layer.
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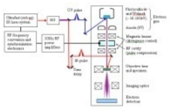
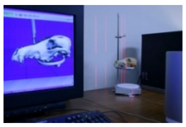
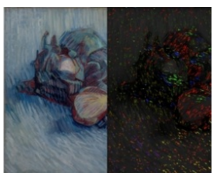


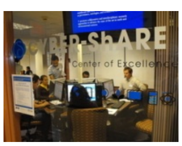
Page 45: Design schematic of the ultrafast electron microscope operated in transmssion mode. A harmonic generator (HG) produces the ultraviolet (UV) drive laser pulse for the electron gun and the residual time-delayed infrared (IR) laser pulse is used to perturb the sample. A magnetic lenses and a 3GHz radio frequency (RF) cavity prepare the photo-generated electron pulse to probe the specimen's transient response.
Credit: W. Andreas Schroeder, University of Illinois at Chicago



Page 46: The first step in the virtualization process: a red fox (Vulpes vulpes) skull is being laser scanned, with the unprocessed output visible on the computer monitor.
Credit: Robert Schlader, Idaho Virtualization Laboratory



Page 46: A computerized technique developed by Penn State researchers attempts to find brushstrokes from digital images of oil paintings. A number of features, such as length, width, shape, and orientation, are calculated from the isolated brushstrokes. The inter-brushstroke characteristics and overall statistics on a painting are also analyzed and compared with those extracted from authentic paintings. Left: "Red Cabbage and Onions" by Vincent van Gogh; Right: Automatically identified brushstrokes, with colors indicating different orientations of the brushstrokes. (Courtesy of the Van Gogh Museum in Amsterdam and James Z. Wang's Research Group at Penn State)
Credit: Courtesy of the Van Gogh Museum in Amsterdam and James Z. Wang's Research Group at Penn State



Page 48: Hands-on activity at the Fall 2008 workshop on using TeraGrid and Cyber-ShARE's high-performance computing resources.
Credit: Ann Gates, University of Texas at El Paso

Page 48: Map of the National Nanotechnology Infrastructure Network user facilities that provide researchers open access to resources, instrumentation and expertise in all domains of nanoscale science, engineering, and technology.
Credit: National Science Foundation

Page 50: These robots are part of the multi-robot testbed and include a custom suite of sensing, computing and communication equipment. Experiments using these robots range from demonstrating control systems that move the robots in formation to a spoken dialogue interface that allows a single operator to command the robots through normal speech.
Credit: Dr. Christopher Kitts & Mr. Ignacio Mas, Santa Clara University