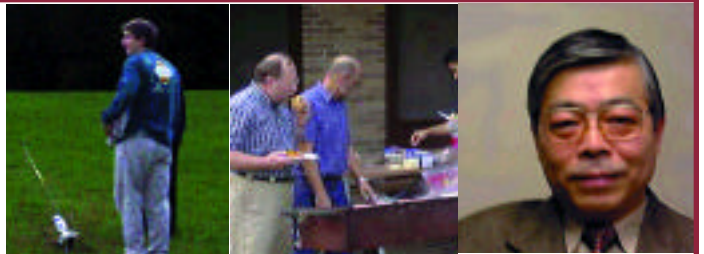


Imaging



Connection

The Newsletter of the Chester F. Carlson Center for Imaging Science

Fall 1999

National Conference Comes to RIT

The annual National Imaging Technology in Education Conference (NITEC) comes to RIT in July 2000. The conference is expected to bring 250 teachers from all over the country to the Chester F. Carlson Center for Imaging Science (CIS) for three days of seminars and presentations. Topics will include applications of visualization techniques in geographic information systems, remote sensing, virtual reality, 3-D modeling, planetary and terrestrial exploration, and forensic science. All conference sessions will focus on enhancing connections between industry and education in order to prepare students for a wide range of technological benefits and future challenges.

The NITEC conference is organized by the Center for Image Processing in Education (CIPE), a nonprofit organization formed in 1992, and based in Tucson, Arizona. CIPE promotes the use of visualization technologies for innovative educational applications and presents professional development workshops on how to use state-of-the-art image processing technology as a teaching tool. So far, CIPE has trained more than 4,500 educators nationwide. Most of these CIPE-trained educators are teachers of grades K-14.

Fresh approaches and first-hand experiences are the hallmarks of every NITEC conference. Through direct explorations, participants learn about the newest advances in image processing and analysis, and meet col-

leagues from across the nation who successfully use visualization technologies in their classrooms. Teachers enjoy the fact that NITEC is a wonderful opportunity to hear enthusiastic students describe the creation of their own exciting projects. Expert consultation on specific classroom needs is available throughout the conference.

Pre-and post-conference workshops will offer introductions to visualization software and instructional materials products. Conference sessions will detail exciting approaches to curriculum innovations in biology and allied health, environmental technology, technology education and more. Specialty field trips will take advantage of research labs and projects in the Rochester area.

The move to bring the NITEC conference to RIT is just one aspect of a broader teaming agreement between CIPE and CIS arranged during a visit by CIS Director Ian Gatley to the NITEC '99 conference in Tucson. Gatley gave a talk on "The Future of Imaging," cataloging the impact of new imaging technologies in many scientific fields, including remote sensing, astronomy, medical imaging, and industrial monitoring, and in common everyday applications like cameras, copiers, printers and scanners. He suggested that these sweeping changes demand a careful and ongoing revision of teaching curricula in the age of "digital literacy."

Gatley also described a new ini-

tiative, led by CIS Professor Jon Arney, to teach high school teachers about imaging science. During the past summer, Arney and his team (many of whom are CIS students) worked with local teachers to develop and deliver training classes designed to provide teachers with the skills necessary to capture images, to manipulate those images, and to extract information from them.

The similarity between the broad goals of the CIPE and CIS programs is the underlying reason for the teaming agreement. The team will develop methods, teaching material and software to teach science through imaging, and will coordinate distribution through workshops, training and conferences as part of RIT's First-In-Class initiative in Imaging and Publishing.

"We quickly realized that the innovative and exciting program CIPE is introducing into the schools is a perfect preparation for a college career in imaging at RIT," recalls Gatley, with a broad smile. Also smiling are CIPE Associate Directors Steven Moore and Marie LaVigne and Business Manager Kristine Rees, who visited RIT to make conference arrangements in early September.

"We have been looking for a university partner with a strong imaging program to host the NITEC conference," said Moore, "And RIT is a perfect fit." Information about previous NITEC conferences can be found at: www.cipe.com/NITEC/NITEC.html

Welcome to the Imaging Connection

I am excited to welcome you to the first issue of the **Imaging Connection**. The purpose of this publication is to inform you of the Chester F. Carlson Center for Imaging Science activities, update you on its continuous growth and progress, and most important, to connect with you—hence the name, **Imaging Connection**. We hope to make your connection an easy and fun experience by including interesting images, exciting articles from CIS alumni, faculty and students, highlighting new projects, and technical articles, too.

The **Imaging Connection** will be published prior to the Chester F. Carlson Center for Imaging Science Industrial Associates Meetings in the fall and spring. At that time it also will become available on our website: www.cis.rit.edu. Enjoy reading the future issues and “connect” with us regularly.

If you have comments, article suggestions or questions, I would love to hear from you. Please contact me by email at: desimone@cis.rit.edu

Colleen Desimone,
Managing Editor

Landsat 7 Images Rochester

With the help of NASA's new Landsat 7 satellite, researchers at the Chester F. Carlson Center for Imaging Science are getting a closer look at the Great Lakes than ever before.

"Landsat 7 is equipped with a much more sophisticated instrument than ever before available," says John Schott, RIT's Frederick and Anna B. Wiedman Professor of Imaging Science. "The first images we've received from NASA look very good, and it appears that the new data will give us a much better understanding of what goes on in the lakes. We can see very clearly discharges from streams and other sources that we couldn't see before."

The satellite, launched in April 1999, is part of NASA's Earth Observing System, a suite of spacecraft and interdisciplinary science investigations dedicated to advancing understanding of global change. Schott is one of 14 researchers selected for the Landsat 7 Science Team.

Schott, who directs the Digital Imaging and Remote Sensing Group, has studied

continued on back page the Great Lakes for more than two decades, paying particular attention to the "thermal bar" that develops each spring. The thermal bar forms as warm spring runoff initially stays

near the shoreline, not mixing with the colder water of the lakes. For the two months that the bar persists, it has a dramatic impact on water quality, as salt, sediment, fertilizer and chemical pollutants in the runoff are concentrated close to the shore.

Schott's work should prove helpful in understanding how the release of industrial pollutants into the Genesee and Niagara rivers during the thermal bar formation in Lake Ontario affects the lake's ecosystem. Thermal-bar formation occurs during the spring when plants and animals in the lake are in the early stages of development and are most vulnerable to pollution.

Besides receiving data from the new satellite, Schott and his team helped calibrate the satellite's Enhanced Thematic Mapper Plus instrument. The ETM+—the eyes of the satellite—is a passive sensor that measures solar radiation reflected or emitted by the Earth's surface. The instrument has eight bands sensitive to different wavelengths of visible and infrared radiation.

The DIRS team has designed, con-



A "true" color Landsat 7 Image of downtown Rochester and the shoreline of Lake Ontario, including the Genesee River and Irondequoit Bay on 03 July 99. The visible and NIR bands have spatial resolution of 30m.

structed and extensively tested a device called the Modular Imaging Spectrometer Instrument (MISI), described by Schott as "an exotic, hyperspectral system" capable of capturing information well beyond the visible spectrum. The device is loaded onto an airplane that flies under Landsat 7, essentially "seeing" what Landsat is seeing. Comparisons of the readings from the two sources are used to calibrate the satellite's imaging device.

Food, Fun and Science at CIS Annual Fall Picnic



Drew Moore, Al Piterman, and Di-Yuan Tzeng enjoy a picnic dinner with Carolyn Kitchen, Jon Arney and Rich Hailstone keep a close watch on the burgers, Roger Easton watches Lee Sander's egg toss and Matt Banta participates in Jeff Pelz's rocket show.

RIT Steps Up to Imaging and Publishing Initiative

Beginning this fall RIT will implement "First-in-Class" -- the vision of RIT president Albert Simone designed to carry RIT to the next level. First-in-Class is designed to position RIT as a world leader in the view of strategically selected segments of industry and government. The first area targeted by First-in-Class is "Imaging and Publishing."

The Imaging and Publishing Initiative focuses on two interdependent themes: Imaging Devices and Materials (IDM), and Integrated Publishing Systems (IPS). Imaging devices and materials include such things as sensors, cameras and scanners, printers and presses, display

devices, image quality measurement instruments, inks, toners, coatings, adhesives, and substrates. Integrated Publishing Systems are built out of these individual components.

The multi-disciplinary Imaging and Publishing initiative draws on the expertise of faculty and staff in technologies such as printing, imaging science, graphic design, photography, information technology, and manufacturing. At its Spring '99 meeting the RIT Board of Trustees approved a \$50 million program in Imaging and Publishing that will invest in new people and new facilities, including appointment to faculty positions of 16 of the finest minds in fields relevant

to imaging and publishing. These appointments will strengthen and expand the knowledge base in Imaging Devices and Materials and Integrated Publishing Systems.

The Imaging and Publishing Initiative has a simple bi-directional mission: Make RIT the world's leading knowledge center for imaging and publishing, and to bring the world of imaging and publishing to RIT. It will establish a new kind of relationship between RIT and external partners, based on a more comprehensive, integrated, and accessible catalog of intellectual capabilities.

Xerox Professor Wins Prestigious Award



Noboru Ohta, Xerox Professor in Digital Color Imaging Systems at the Chester F. Carlson Center for

Imaging Science, received the Order of Merit Award from the Society of Photographic Science and Technology

of Japan.

Ohta was honored for his outstanding contributions to imaging science, particularly in the area of color reproduction. He has published more than 80 scientific and technical papers and two textbooks. He is translating the two books from Japanese into English. He was also cited for his significant and longstanding service to the standardization of color reproduction, and to the society itself. The

award was presented at the annual meeting of the society in May in Tokyo.

Ohta, who was named Xerox Professor in August 1998, is internationally known for his work. Ohta was a research scientist with Ashigara Research Laboratories of Fuji Photo Film Co. for more than 30 years, and continues his work in Japan and at RIT.

Astro Pipeline Project Connects Globally

Thanks to the work of a team of students and faculty at the Chester F. Carlson Center for Imaging Science, astronomers around the world have a pipeline to the stars.

The CIS team's Astro Pipeline collects, processes and distributes data from an infrared telescope at the Center for Astrophysical Research in Antarctica (CARA).

CARA's South Pole Infrared Explorer (SPIREX) telescope is ideal for extensive large-scale infrared surveys of star-forming regions in the Milky Way and Magellanic Clouds. Throughout the six-month-long austral winter, which began March 21, the camera captured images continuously, weather permitting. The data from the camera was transmitted to RIT via satellite for processing. The software developed by the RIT team can distill hundreds of images to create pictures of, say, stars forming in clusters of cosmic dust.

"We collected many very nice images taken in good conditions," says Joel Kastner, associate professor, astronomical imaging and spectroscopy. Kastner came to CIS in July from Massachusetts Institute of Technology, where he worked on the widely publicized Chandra X-Ray Observatory project.

Kastner also is one of the astronomers who had proposals accepted for the CARA program this year. "I'm looking at the remnants of dying stars," he says, adding that he is eager to receive "his" data, analyze it and publish his findings.

The infrared telescope at the South Pole holds great potential for

discovery, Kastner believes. "It's probing areas that have never been seen."

The Astro Pipeline project came to RIT via Ian Gatley, director of the Chester F.

Carlson Center for Imaging Science. Prior to coming to RIT in 1997, Gatley was an astronomer at the National Optical Astronomy Observatories, where he helped develop the CARA instrument.

RIT's multi-disciplinary Astro Pipeline team is made up of: Adith Chandrasekhar, a graduate student in imaging science; Erika Tolar, James DeFelice and Stephen Schaeffer, software engineering undergrads; Bob Krzaczek and Scott Lawrence of the CIS staff; J. Fernando Naveda, software engineering professor; Harvey Rhody, Ian Gatley and Joel Kastner, imaging science professors.

The development of Astro Pipeline required expertise in many technologies (including several programming languages), as well as strong interpersonal skills. Team members—including the three undergraduate students—have worked with leading scientists from the other institutions involved in CARA. "The complexity of this project," says Rhody, "is hard to overstate."

The Astro Pipeline is paving the



Darren DePoy and Paul Martini collecting images at the South Pole.

way for a project with NASA. The Chester F. Carlson Center for Imaging Science will develop a similar system for SOFIA, the Stratospheric Observatory for Infrared Astronomy, an airborne telescope.

But Gatley believes the method of building a strong, interdisciplinary team to work on complex, multi-faceted projects may ultimately be more important than any one project. "This has been a prototype in knowledge networking," he says, noting that the network in this case extends beyond RIT to people in other parts of the world working on other aspects of the project.

"We've taken a manufacturing approach, a production-line approach, and it happens to be a very good way to get a lot of very good work accomplished."

More information about the RIT project, including images from the SPIREX telescope, is available on the Astro Pipeline Website, at: pipe.cis.rit.edu

IS&T Honors CIS Faculty

The Society for Imaging Science and Technology recently honored two faculty members from the Chester F. Carlson Center for Imaging Science.

Roy Berns, R.S. Hunter Professor in Color Science, Appearance and Technology, received the Journal Award. The award recognizes an outstanding contribution in the area of basic science, published in the Journal of Imaging Science and Technology during the preceding year. Berns and Koichi Iino, visiting scientist, were honored for their scientific papers, "Building Color Management Modules Using Linear Optimization I and II."

Jeff Pelz, assistant professor, received the Raymond C. Bowman Award, which recognizes a person who has been instrumental in helping individuals pursue a career in the technical scientific aspects of imaging science.

Polaroid Scholarship

Matthew Webber of Westborough High School in Massachusetts, took home the inaugural Polaroid Corporation/Rochester Institute of Technology Imaging Science Prize awarded last spring at the Massachusetts State Science Fair.

The Polaroid/RIT Imaging Science Prize carries a \$500 award presented at the fair, an additional \$1,500 from Polaroid Corp. to be paid after the winner completes the first semester of college, and a \$2,000 scholarship (\$500 annually) from RIT if Matthew chooses to study here.

The Polaroid/RIT science fair prize grew out of discussions about ways to increase the number of people prepared to enter the imaging industry workforce. Jay Thornton and John Francis, '89, at Polaroid Corp., were instrumental in establishing the prize.