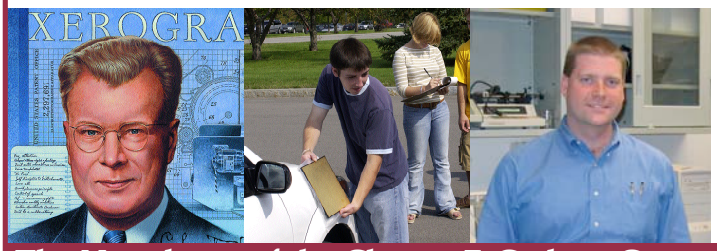
Imaging Connection



The Newsletter of the Chester F. Carlson Center for Imaging Science Fall 2004, Issue 10

CIS Welcomes Dr. Stefi Baum

An astronomer from the Space Telescope Institute (STScI), is the new director of Rochester Institute of Technology's Chester F. Carlson Center for Imaging Science.

Stefi Baum joined RIT in July after 13 years at STScI, the science operations center for the Hubble Space Telescope and the next generation space telescope, the James Webb Space Telescope (JWST).

Baum earned a B.A. in physics from Harvard University and a Ph.D. in astronomy from the University of Maryland. Her research focuses on the study of activity in galaxies and its relation to galaxy evolution. She has published 130 papers on her research.

While at STScI, Baum was the division head of the engineering and software services, andsupervised close to 140 scientists, engineers and computer scientists. She was responsible for the development and maintenance work for ground systems of the Hubble telescope and JWST. Earlier, she led the science operations center development and deployment of a major astronomical instrument, the Space Telescope Imaging Spectrograph. Prior to that, she was lead scientist on the development of the Hubble Space Telescope archive, the first real functional archive pipeline for astronomical data.

Most recently, Baum completed a diplomacy fellowship program through the U.S. Department of State and American Institute of Physics while on a leave of absence from STScI. Branching out from astronomy, her work there promoted agriculture-biotechnology in developing and developed countries.

Baum brings to CIS an appreciation of the synergy between engineering and sciences that she learned at STScI and facilitating and consensus-building skills she refined as a diplomacy fellow.

"The Center, for me, is the place where a number of different technical and scientific pursuits that contribute to or rely on imaging—from astronomy to biomedical imaging to remote sensing to color science to visual perception—come together in a way where these related disciplines benefit from each other," Baum says. "I'm thrilled to be involved with all aspects of CIS."

Ensuring the smooth operation of the Center is one of Baum's objectives. She is committed to making sure CIS provides "an environment where research is unencumbered and where people doing the teaching and researching can concentrate on their core mission and activities of education and pushing back the frontier of knowledge."

Dr. Stefi Baum, CIS Director

Baum is eager to explore the breadth of imaging science and all it encompasses through partnerships with local and global industry. Exploring academic partnerships on campus—opening up CIS to the rest of the university for active collaboration—is also a prime objective for her. Part of that will include educating others about the somewhat mysterious name, "imaging science."

- article continued on back page

Inside CIS News

CIS Undergraduates and High School Interns Collect Spectral Data for Auto Paint Research

Students working in the Digital Imaging and Remote Sensing Laboratory (DIRS) in RIT's Chester F. Carlson Center for Imaging Science (CIS) know more than the average person about white automobiles. Not red, blue or black, for that matter, but white.

A team of five undergraduates and three high-school interns spent the few sunny days in August measuring spectral properties of white automobiles for a study funded by General Dynamics. The data—collected with the owners' permission and after a complimentary car wash—will be stored in a national spectral archive. Spectral information can be used to simulate scenes from the real world for purposes as diverse as homeland security and environmental conservation. The scope of this experiment will expand in the future to include more colorful vehicles.

Students working on the project include imaging science majors Bethany Choate and Brian Leahy, photo tech major Jessica D'Amico, undeclared science major Jesse Schott, environmental science major Ken Smith, and CIS high school interns, Jim Cretekos, from Victor High School, Tina Kieffer, from Nazareth Academy and David Snyder, from Lima Christian School.

Lon Smith, staff scientist in the DIRS lab, coordinates the student team. Under his guidance, the students measure the reflectance from the sun and the surface temperature of the car as quickly as possible to avoid slight changes in the environment—from cloud coverage to a passing vehicle—that could alter the temperature of the vehicle and corrupt the data.

The students work in groups of three. While one student operates the infrared spectrometer, another holds a gold reference plate to calibrate the measurements. A third student records the make and model of the vehicle, weather conditions that may influence the data collection, and documents the location of the measurements on the car.

Ken Smith, an environmental science major, left, helps Brian Leahy, an imaging science major, take spectral measurements of a white car for a national archive. Standing in the background from left to right, are Bethany Choate, also an imaging science major, Jim Cretekos, a high-school intern from Victor High School, Phillip Salvaggio, son of professor Carl Salvaggio, David Snyder, an intern from Lima Christian School, and Tina Kieffer, an intern from Nazareth Academy.

Smith and his crew performed the assignment at the beginning of September with a goal of measuring 30 vehicles. Collecting spectral data depends on nearly perfect weather conditions and using the sun as a source. Given the unusually rainy summer, the team has learned to be flexible and to work fast when given a nice day.

"If you wait for a perfectly cloudless day in Rochester, you'll wait forever," Smith says.

Alumni News Spotlights

As always, we love to hear from our CIS graduates. The *Imaging Connection Newsletter* is a great way to share your excitement for the company you work for and how you have put your imaging or color science education to use.

If you would like to volunteer to be interviewed for our alumni spotlight, send Colleen Desimone an email to: *desimone@cis.rit.edu* Be sure to include your name, daytime phone number and a brief update about yourself. Looking forward to hearing from you.

Imaging Science Students Contribute to Homeland Security Technologies

A strong background in imaging science has landed a Rochester Institute of Technology student a scholarship from the U.S. Department of Homeland Security Scholars and Fellows Program, the first ever for an RIT student.

The DHS awarded Bethany Choate, a third-year student in RIT's Chester F. Carlson Center for Imaging Science, the scholarship based on her academic accomplishments and her field of study. The award will cover her tuition and fees, and provide a stipend during the school year, a paid internship next summer and employment opportunities following graduation.

"I thought the program would be a good opportunity, " Choate says. "The importance of ensuring safety is definitely a worthwhile thing to partake in."

The DHS Scholars and Fellows Program, in its second year, was established to support the development and mentoring of the next generation of scientists as they study ways to prevent terrorist attacks within the United States, reduce the country's vulnerability to terrorism and minimize the damage and recovery efforts from attacks that occur. The award is designed for students interested in pursuing the basic science and technological innovations that will ensure homeland security.

Choate is among the award recipients chosen from 450 undergraduate applicants. Last year, the DHS gave scholarships to 50 undergraduate scholars out of 928 applicants and 50 fellows from among 1,548 graduate applicants. Engineering students comprised nearly one-third of the awards distributed last year followed by computer science and math, psychology and social sciences.

"I think Bethany's selection for this program clearly shows that the senior leaders in the U.S. Department of Homeland Security appreciate the important role imaging science plays in the accomplishment of their primary mission," says Joe Pow, assistant director of RIT's CIS. "I'm confident that she's just the first of many imaging science students who will benefit from the DHS scholarship program in the future."

Imaging science can be used in a number of different ways to aid homeland security. Remote sensing—high-resolution satellite or airborne photography—can identify objects, air and water quality, ground conditions and factory emissions, for instance. Other imaging science applications can detect counterfeiting and verify personal identification through biometric applications such as scanning fingerprints or irises.

Choate learned about the field of imaging science in 2001 as a junior at Rush-Henrietta High School participating in CIS' summer internship program for local high school students.

"One of the things that drew me to imaging science is because it is so open—there's a variety of things you can do with it," she says.

Lon Smith, an assistant scientist at CIS and Choate's supervisor in RIT's Digital Imaging Remote Sensing laboratory, suggested she apply for the DHS scholarship.

Bethany Choate, third year Imaging Science student.

"Bethany is a unique individual who has the proven ability to master the science and mathematical skills required for the imaging science program," he says. "Bethany is also one of the most creative individuals I have met. I see these attributes as her key to future success in any endeavor she pursues."

On-Line MS Program Offers More Job Opportunities

You Can Be An Artist and a Scientist!

Robert Girandola recently graduated with his Masters in Imaging Science with the Rochester Institute of Technology. He started studying for this degree in the Fall of 2000 as part of RIT's on-line learning program. Robert completed an undergraduate degree, earning a Bachelor of Science in Molecular Biology at Fairfield University and a Masters Degree in Fine Arts from Columbia University.

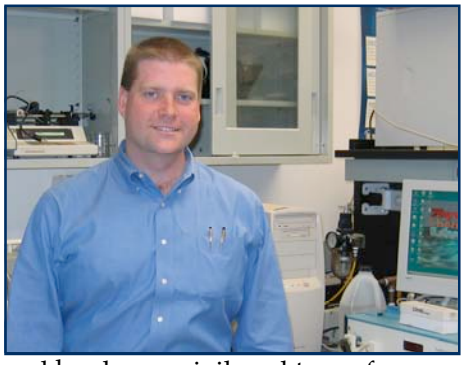
Robert has been drawing and painting since the age of five. As he explains, "I've always had a profound interest in art, and specifically painting and drawing." Robert's father also strongly encouraged the study of mathematics, chemistry and biology, hoping his son would one day "be a doctor." Upon completion of his undergraduate degree, Robert pursued a career in the pharmaceutical industry. After a period of time, he decided to pursue a Masters in Fine Arts to complete his long-standing love of painting. This mix of interests eventually led to a position working with color in the cosmetics industry. There, Robert found interesting challenges in the science of measuring color and its expression as an experience of beauty. It was in the cosmetic industry where Robert met Ralph Stanziola. Mr. Stanziola introduced Robert to the field of spectrophotometry and colorimetry. Robert then spent several summers at Rochester Institute of Technology, attending short courses in the field of colorimetry, vision and psychophysics. When RIT offered the distance Masters of Science degree in Imaging Science, Robert jumped at the chance. He notes, "I thought this was an opportunity to make sense out of my many different areas of interest. I think I can best summarize this particular field of study as dealing with how we measure and how we 'perceive' what we measure. This is to me, the summation of my interest as an artist and a scientist." The Imaging Science degree includes the study of vision, psychophysics, optics, colorimetry, spectrophotometry and programming. Each area of study informs the other. For Robert, this has led to a fuller understanding of why the same stimulus (color) could appear different to different people and how the process of communicating visually is influenced by the medium. Robert concludes, "The extent of this field of study better serves me as an artist and a scientist and can be applied to any endeavor that requires human evaluation."

Robert is married with three children 8, 6 and 2. He is a Director of Quality Assurance for powder manufacturing at the Estee Lauder Companies. Robert has been with the Estee Lauder Companies for over eleven years.

Quality Assurance Using Imaging and Color Science Technology

Michael Surgeary is an on-line learner at CIS and last spring he will have complete the requirements for the Imaging Science Master's Degree with a concentration in color science. Michael began coursework during the CIS's inaugural on-line learning quarter and is proud to be referred to as "one of the pioneers" by Dr. Harvey Rhody, Coordinator MS Program.

Michael is married to his beloved wife Karen and they have nine-year old twin daughters. Erica and Allison were born five hours apart and take pride in having their own birthdays! Michael especially enjoys sharing the wonders of science with his children



and has been privileged to perform experiments at his children's elementary school. "I love seeing young eyes filled with amazement and I hope to influence many of them to embrace science."

As a child Michael was fascinated with science and while attending high school he made a career in science his ambition. Michael earned a BS in chemistry at Stony Brook University and then worked as a QC chemist for DuPont/Merck analyzing Coumadin and other pharmaceutical drug items. During his senior year at Stony Brook he enrolled in an internship program with Estee Lauder. Eventually, Michael returned to Estee Lauder and is in his 10th year with the company. As the Quality Assurance lab project manager Michael investigates formula/process defects and researches new laboratory technologies. Michael developed and

- article continued on back page

Color Science Techniques Used to "Turn Back the Clock" on Aging Works of Art

The combined magic of color science and digital photography can bring aging artwork back to life through simulations that leave the original work untouched.

RIT professor Roy Berns has used color science techniques to "turn back the clock" on paintings by Vincent Van Gogh as well as the Star Spangled Banner. His reputation as a color scientist in the art world led to an invitation to digitally simulate Georges Seurat's masterpiece, La Grande Jatte, for a new exhibition at the Art Institute of Chicago.

Roy is verifying his spectrophotometric measurements of the dots and dashes comprising Seurat's pointillistic brushwork using the Munsell Book of Color. This brown color was a luminous yellow before Seurat's zinc yellow darkened.

Seurat and the Making of La Grande Jatte, that was on view in September, brings to light new information about the 19th century French artist and his famous work painted in the Pointillist style using dots and dashes of color. The exhibition included Berns' digital simulation of the nearly 7-by-10-foot painting depicting the people of Paris enjoying a sunny afternoon. The recreation corrects a wayward yellow pigment and refreshes the entire surface, simulating what it might have looked like when first shown to the French public in 1886.

"The AIC contacted me and asked if I thought it was possible to correct the painting digitally to show what the dots would have looked like before they turned brown," says Berns, the Hunter Professor in RIT's Munsell Color Science Laboratory (MCSL) in the Chester F. Carlson Center for Imaging Science. "I was really honored that the they asked me, and I was confident I could develop a practical approach by enlisting the expertise of my MCSL family."

To correct the color digitally, Berns blended color science and color imaging techniques, a hallmark of MCSL, and a method used in paint stores for making custom colors.

He took optical and visual measurements without removing samples from the painting, including measuring the spectral reflectance of the darkened dots using a spectrophotometer, a hand-held device that determines the amount of light reflected and absorbed by different pigments.

To figure out the "color mathematics," Berns compared this information to measurements taken from fresh samples of pigment Seurat would have used. The resulting data enabled Berns to computationally replace the degraded yellow pigment that had been mixed in with other colors.

"The project evolved as I was trying to correct the painting digitally to show what the dots would have looked like," Berns says. "The science evolved as well as the technique for making the digital rejuvenation."

The final technique Berns developed gave the museum staff the capability to replace the pigment digitally, dot by dot, and complete the extensive image processing at the museum.

"The technology enables the museum to make a representation of how the painting might have looked in the late 1880s before the yellow pigment started to darken and before the painting underwent normal aging," Berns says. "It will give some sense about why people had such strong opinions about it when the painting was first exhibited."

CIS Director

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"In an interdisciplinary field like this, you are constantly challenged by the need to inform the faculty, students and public what is meant by imaging science, to show them that it is a field that encompasses many topics they already know about, are engaged in and benefit from."

Baum and her husband, Chris O'Dea, who has joined RIT's physics department, reside in Pittsford, N.Y., with their four children, Connor, Kieran, Brennan and Annelies, and their pet family of three dogs, two cats and a hedgehog. The Baum-O'Dea clan is an active family that enjoys traveling together on trips inside and outside the United States. When not busy with her family, Baum uses her spare time to indulge her passion for gardening, which she calls her "one true hobby."

QA Using Imaging...

Continued from pg. 4

implemented the company's near infrared spectroscopy (NIR) program. His unique approach to qualitative and quantitative NIR analysis of cosmetic ingredients and products provided quicker test results and improved quality. Michael was honored when asked to speak at NIR user meetings in the US and in Belgium. Michael also facilitates the color technology program at Estee Lauder's main manufacturing plant. It was in this capacity Michael attended the Munsell Color Science Laboratory Summer School in 2000, a one-week course geared towards industry. "I was so impressed with The Center for Imaging Science, the faculty, and the graduate students. When I learned about the new distance learning opportunity it was an easy decision to apply."

Michael looks back fondly at his experience at RIT. "The program was rigorous and challenging. I saw it evolve from chat room style lectures, where your only interaction was reading typed words, to watching video recorded on-campus lectures and participating via phone conference. The one constant throughout the program was the extraordinary effort put forth by the RIT faculty."

Michael likes to spend his free time having fun with his family, reading about the history of science, and enjoying baseball. Michael is originally from Queens, New York, and now lives and works on Long Island. "I love being minutes from the ocean and a short car ride from New York City. We try to take advantage of both whenever possible."

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