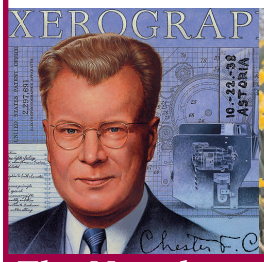
Imaging Connection





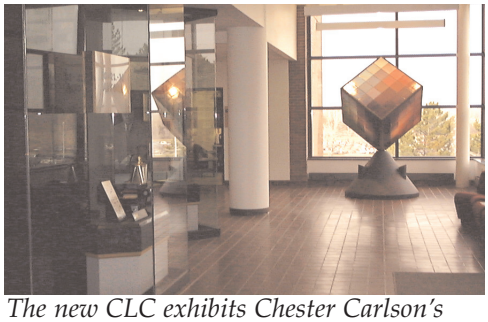

The Newsletter of the Chester F. Carlson Center for Imaging Science Spring 2000

CLC – More Than Just a Meeting Place!

The former seminar room on the first floor of the Chester F. Carlson Center for Imaging Science has been remodeled; now it's more than just a meeting place! About three years ago Catherine Carlson met with center Director Ian Gatley to discuss options for displaying Chester's memorabilia in the center. They decided to remodel the seminar room for the purposes of exhibition and education. Dorris Carlson and the Chester and Dorris Carlson Charitable Trust funded the new Carlson Learning Center (CLC).

With the expertise of The DeWolff Partnership, architects, and James Sias, RIT School of Design, blueprints for the room and glass display were developed. When the dust cleared, it was time to focus on what the room would offer in terms of education. Bryce Nordgren, CIS staff, researched the state-of-the-art electronic equipment and made it all come together.

The display wall of memorabilia from Carlson's life and work, as well as the equipment recently installed, has everyone talking. An amazing set of



The new CLC exhibits Chester Carlson's memorabilia in a glass display.

digital tools has revolutionized communication capabilities for in-classroom presentations, education at a distance, and videoconferencing.

A "smart" whiteboard captures and prints notes, and acts as a giant computer touch-screen. A document/object camera projects pages of books and papers. Cameras and microphones are in place to videotape presentations, and computer and video material is projected onto a sixteen-foot screen. The entire complex is operated from a wireless touchpanel control system.

Distance learning (DL) classes among three sites have gone smoothly almost from day one. Students report that the equipment worked right away, that audio levels were soon set properly, and that a minor problem with feedback from one of the other sites was quickly eliminated.

Typically the presenter prepares a Powerpoint presentation which is made available prior to class. Each site has two screens: one showing the instructor presenting and one for the downloaded presentation; slides at each site are advanced manually. A wireless microphone is passed to students with questions.

A local teleconferencing site has advantages not limited to DL classes. The opportunity to hold teleconferences is greatly augmented by the ability to sustain 30Hz video from a camera, document camera, videotape or computer. When it comes to expressing "this is what I mean," the Carlson Learning Center is the next best thing to actually being there.

New furniture will be in place for the April Industrial Associates meeting.

Distance Learning Comes to CIS Fall of 2000

The Chester F. Carlson Center for Imaging Science will offer the master of science in imaging science with the color imaging track via distance learning(DL), beginning fall quarter, 2000. Distant learners will have the opportunity to enroll in color science courses as they become available, one element of the Imaging and Publishing Initiative established through RIT President Albert Simone's First-in-Class program.

The color imaging track was chosen as the first one for this program because there is a great deal of interest in color science and color imaging from potential students who cannot attend RIT either due to scheduling or geographic constraints. This track will be the test case for DL for the center. As this program is implemented, we expect that additional courses will be added which will bring in more students interested in other aspects of imaging science.

CIS Team Developing New Sensors for NASA

A Rochester Institute of Technology professor is developing new solid state sensor arrays for use in the harsh radiation environment of space. NASA's Space Astrophysics Program is providing $679,700 in funding for Zoran Ninkov, Professor of Imaging Science, and his research team to continue to fabricate and test improved CMOS image sensors in partnership with Raytheon Corp. and the University of British Columbia in Canada.

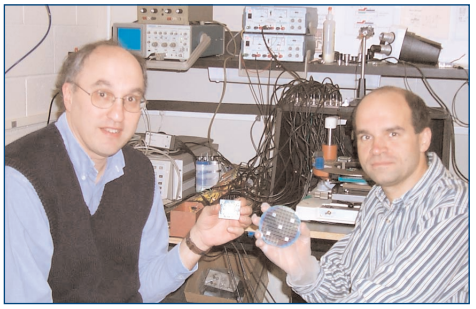
The standard imaging sensor used in many consumer applications, such as camcorders and digital cameras, is the silicon Charge-Coupled Device (CCD). Since its invention 30 years ago, the CCD has seen remarkable improvements in size and sensitivity. Arriving light creates electronic charges in the CCD pixels, which is then transferred from pixel to pixel in a column to the end of the row, where the electronic signal is amplified and measured.

The Achilles' heel of the CCD is the requirement to transfer charge. In the environment of space, the radiation from the sun, earth, and other sources often damage the charge-transfer capability, and thus may destroy the sensor.

Ninkov's team has been working for several years to develop sensors that do not require transfer of charge by adding an amplifier at each pixel in a CMOS array. This work has been performed in collaboration with CIDTEC Inc. of Syracuse and Professor Lynn Fuller of RIT's Department of Microelectronic Engineering, and supported by NASA, NSF and a NY State Center for Advanced Technology.

The new research effort for NASA takes a different approach. The sensor and amplifier will be sandwiched together vertically using indium-bump bonding. As in the CCD, incoming light will be converted to electrons within the silicon. The electrons will then diffuse into a region beneath the sensor where they will be amplified and transferred directly off chip. As well as providing a radiation-resilient detector array, this architecture allows individual pixels to be addressed directly, thus allowing much larger readout rates. The array also may be read nondestructively, meaning that the signal may be measured as more light is being integrated; this feature is not possible with CCDs.

Besides its obvious application in astronomy, such arrays will also be useful for terrestrial imaging, such as for mapping lightning, in medical photon-counting applications, and in machine vision applications where only a part of the scene is of interest.



Dr. Zoran Ninkov and Ph.D. student, George Lungu displaying an active pixel sensor.

"If you build good technology, there will be many applications found for it, often unimagined initially," Ninkov says.

His team at RIT includes graduate and undergraduate students in Imaging Science and Microelectronic Engineering, postdoctoral fellows, and faculty colleagues at RIT, the University of Rochester and the Laboratory for Laser Energetics.

CIS Alumnus Patents Automated Imaging System

When imaging science alumnus Howard Broughton (RIT, Imaging Science, '93) talks about tooth fractures, he isn't describing a dental problem.

Howard is a member of the Imaging Technology Center at NASA's Glenn Research Center in Cleveland, Ohio where he recently developed and patented an automated imaging system that documents gear degradation. The digital-video imaging system records images of individual teeth on two meshing planetary gears rotating at high speeds and documents the progression of tooth wear, gear pitting and tooth fractures that lead to overall gear failure.

As a scientific imaging specialist, Broughton assists researchers by designing and building specialized imaging-and-data acquisition systems for various experiments. He is also currently involved in in-flight icing research, infrared imaging of aircraft anti-icing systems and various microgravity experiments.

In support of the gear-mesh diagnostic research conducted at the Glenn Research Center, Broughton's method improves on previous imaging techniques restricted to post-test analysis. His system, for instance, is computer-controlled and acquires digital images, making it fully automated and integrated into existing hardware and software. Data collected from Broughton's imaging system will enable researchers to identify specific events in the failure process and better understand the causal factors of gear failure.

Broughton has co-authored and presented many technical papers at various symposiums around the country, including IS&T and SPIE conferences. He is currently pursuing a master's degree in business administration at Case Western Reserve University.

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.

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