

SYNERGY

FALL 2007 BECKMAN INSTITUTE FOR ADVANCED SCIENCE AND TECHNOLOGY ISSUE 7

Making Research Happen: From Idea to Virtual Reality



Beckman's Integrated Systems Laboratory and psychology researchers combined to create a novel experiment for studying pedestrian distraction during traffic situations. [Page 2](#)



The topics of intellectual property protection and technology transfer are of increasing importance to researchers, one reason the University of Illinois office overseeing such matters now has an office at Beckman. [Page 4](#)



Beckman faculty member Rohit Bhargava moved from a research job in government to a professorship at the University of Illinois in large part so he could work with students. [Page 7](#)

Making Research Happen: From Idea to Virtual Reality

ISL, Researchers Create Unique Experiment for Innovative Pedestrian Distraction Study

After successfully navigating his way across the busy street, psychology researcher Art Kramer decides to attempt the crossing again and ends up taking one for science. "You've been hit. Better luck next time," booms a mellifluous, paternalistic voice from above.



Kramer

Kramer is walking on a treadmill situated in the center of the CAVE™, a 3-D virtual reality immersive environment operated by the Beckman Institute's Integrated Systems Laboratory (ISL) that features three wall-sized display screens in front and on both sides, and another on the floor. Kramer recovers from his encounter with the simulated automobile and lets collaborator and Beckman Fellow Mark Neider take his turn in this newest addition to the world of virtual reality psychology experiments. Neider also successfully crosses the street but he, too, wants to experience the sensation of standing in the path of oncoming traffic.



Kaczmariski

"You've been hit. Better luck next time." The voice, like the cars, street, and building on the screens is artificial – an AT&T software version of human sound. The images of moving cars were downloaded from the Internet and the street and building images are from pictures of University campus locales taken by Jim Crowell, ISL's triple threat experiment designer/psychologist/computer programmer.



Neider

Crowell, Kramer, and Neider are in the CAVE this mid-August afternoon fleshing out the final form of an experiment that is groundbreaking in its design and in its research focus. It also marks the first time



Integrated Systems Laboratory staff member Jim Crowell enjoys putting together experiments like the one that uses a modified treadmill to study pedestrian distraction.

the CAVE has ever been used for an experimental study, said ISL Director Hank Kaczmariski.

The meeting in the Beckman basement home of the CAVE is the culmination of a seven- to eight-month long collaborative process between Crowell and Kaczmariski from ISL and Kramer and Neider, with input from Beckman faculty member Jason McCarley. The study being done by Neider and Kramer involves the topic of pedestrian distraction during traffic situations.

Kaczmariski said designing for experiments almost always includes incorporating something novel, so installing a modified treadmill into the CAVE for the pedestrian study "was a pretty typical process."

However, that doesn't make the pedestrian/treadmill experiment any less unique, Kaczmariski said. "This has never been done before, anywhere."

Kramer has been a pioneering researcher in the area of driver distraction, with several studies done in Beckman's driving simulator, located just down the hall

from the CAVE. He said recent news stories about accidents on campus and around town involving pedestrians prompted this new project that will, like the driver studies, focus on the divided attention of test subjects who are using devices like cell phones.

"We thought that maybe we needed to go beyond driver distraction and start examining pedestrians and how distracted they get as they are crossing busy streets and whether or not it had implications for what happened to them," Kramer said.

The initial run-through session had Kramer, Neider, and Crowell brainstorming on final revisions to the experiment. After taking his turn on the treadmill, Kramer asks Crowell if the speed of the cars can be varied.

"We are kind of pushing the rendering power," Crowell cautions, concerned that increasing the complexity of the simulation might affect the ability to display the cars' movements smoothly.

"Are we able to record all the variables with respect to the simulated automobiles, walking speed, whether you're hit or not hit,

where you start relative to where the car is and what the speed is?" Kramer asks.

Yes, they know the speed of the cars and can estimate the speed of the pedestrians, Crowell says.

"What about the distance of a car, say, when they enter the roadway?" Neider asks.

"Sure." The experiment's computer program can even save the test subjects' entire time course at half second or one second intervals throughout the whole course, Crowell adds.

Over the span of the next half-hour, the three discuss the experiment, including issues such as whether to use iPods and if so, what kinds of music (none know what kinds of music "the kids" are listening to so Neider suggests having grad students pick the tunes), or whether to have partners for test subjects if phone usage is studied.

Neider ticks off some of the possible distractions for the pedestrian test subjects: "You could have people just listening to music, you could have them listening to a podcast, or there is the possibility of a different kind of listening going on because they could be watching a TV show on an iPod. Or they could be talking on a cell phone."

Kramer takes things a step further. "We need to buy an iPhone," he says, drawing laughs.

The session ends with Kramer and Neider expressing satisfaction with the design; a little more tweaking and the experiment will be ready for student test subjects in September.

Turning a research idea into the reality of an experimental setting in the CAVE required months of back-and-forth discussions, numerous e-mail exchanges, and ideas that were suggested, cast aside or accepted. The run-through in August with Neider and Kramer was a sort of test-drive in order for Crowell to show the experiment's design to the researchers. While Crowell handled the computer and software requirements, it was up to Kaczmarek to integrate the treadmill into the experiment.

Kramer said there have been studies with treadmills that go at a certain speed but this one operates manually to recreate real-world walking conditions. Kaczmarek modified the treadmill by taking off the display on top and removing a magnet underneath that recorded the number of rotations; he then installed eight magnets that send signals to the PC cluster that powers the CAVE.

The CAVE lab, which had been moved from the third floor to its new home in the basement earlier in 2007, has been used as a testbed for experiments that would eventually be done in the Cube. Kaczmarek said the Cube has become so popular that ISL was forced to start using the CAVE as a facility for experiments, the first being this

pedestrian distraction study.

Crowell, who has a Ph.D. in Cognitive Psychology from Cal-Berkeley, is just one of ISL's staff members who aid research efforts in human multimodal perception and cognition using the lab's advanced technologies. Crowell's role for the past five-and-a-half years has been to assist researchers like Kramer and Neider in setting up experiments.

Crowell is interested in the research side of psychology, but for him the truly interesting part of the equation is the experiment itself.

"The part I like best is the setting up of the experiments," Crowell said. "I have always liked programming and the experiment design part.

"I never so much liked writing things up afterward," he added with a laugh.

Crowell said his background in psychology helps him help the researchers in a number of ways.

"The first and the most obvious way is that when they say something I usually understand immediately what they are talking about, while someone who didn't have the background might spend half an hour figuring it out," Crowell said. "Also, if there is a potential problem in a particular design, I'm fairly likely to be able to spot it, depending on how close it is to my own experience."

Neider said Crowell is "genuinely interested in the experiments we are running" while Kramer said ISL is lucky to have someone with backgrounds in both programming and psychology.

"That's ideal to have somebody with both sets of skills. That's pretty rare," Kramer said. "And Hank's great with hardware."

Neider said the pedestrian distraction study had its origins almost a year before when he, Kramer, and McCarley were "throwing out ideas" for new research topics involving divided attention. Kramer said the number of recent accidents on campus involving pedestrians and vehicles seemed like a good topic, both for study and for potentially helping with prevention.

With cell phone usage a necessary fact of life for most people, and music players like iPods a common sight on city streets, the topic of pedestrian distraction is one that is just starting to reach the public conscious-

ness. In New York a bill has been proposed to ban listening to iPods or talking on a cell phone while crossing the street.

"That's where I'm from and it's a wild world there," Neider said. "But there are times when the driver is doing his job and somebody just walks out in front of a car and it happens. There is a big debate starting to grow about this right now, so we are hoping to provide some informed research."

Neider has done mostly theoretical work in the area of visual cognition, specifically in terms of visual search, but this project involves more applied work than his past research. He said the study has multiple goals, and one of them is to extend basic theory regarding attention. Neider said that much of what is known about cognition and attention comes from inferences made from experiments with simple, artificial tasks.

"The problem with that is that the real world is much different than sitting in front of a computer looking at things like a T and an L, which is a classic visual search paradigm," he said. "So the idea here was to start looking at attention, and in this case divided attention because this is a divided attention task, and how what we know about attention from simple tasks translates into a much more realistic scenario where there are a lot of things competing for attention and the task is much more complex."

Thanks to the capabilities of the CAVE and the experiment's designers, the pedestrian distraction study will offer a setting that is more naturalistic and have much more realistic tasks for test subjects to perform. Kramer said the pedestrian study will seek to learn detailed information about how pedestrians negotiate traffic while performing other tasks.

"We want, first of all, to understand the extent to which people can walk safely and navigate busy streets and do other things like listen to an iPod or talk on a cell phone and so forth," Kramer said. "And we want to quantify what the costs are in terms of walking speed or how closely they get to vehicles, when they step off the curb, and how they judge gaps in traffic because we do that all the time."

One of the places on campus that pedes-

SYNERGY is a quarterly publication of the External Relations office of the Beckman Institute for Advanced Science and Technology at the University of Illinois at Urbana-Champaign. Each issue will spotlight the people and science that make the Institute one of the premier facilities for interdisciplinary research in the world.

Contact information:

*Office of External Relations
Beckman Institute for Advanced Science and Technology
405 N. Mathews, Urbana, IL 61801
www.beckman.uiuc.edu*

*Editor: Sue Johnson, johnso16@uiuc.edu
Writer: Steve McGaughey, smcgaugh@uiuc.edu
Design: Carlton Bruett Design
Web: Rick Valentin, rnv123@uiuc.edu*

Photo Credits:

All photos by the Beckman Institute except for the images on page 4: Steve Wille photo courtesy of Steve Wille, and the self-aiming camera, courtesy of Narendra Ahuja.

trians and drivers of vehicles are asked by flashing lights and signs to regard each other with an eye toward safety is the crossing on Springfield between Wright and Mathews. That crossing will look familiar to test subjects in the CAVE who are participating in the pedestrian distraction study because Crowell said that is the crossing he had in mind when he was putting together the experiment. The building that is visible to test subjects in the CAVE isn't the nearby Grainger Engineering Library to the south, however, or the Digital Computer Laboratory

to the north. Too many trees and other obstacles surrounding them for a clean image, Crowell said.

When he was putting together the experiment Crowell took a walk around campus to scout useful scenes to photograph for the images required on the display screens. He found his building in the new (and as yet treeless or shrub-less) addition to the Micro and Nanotechnology Laboratory just south of Beckman. The virtual crossing has a black asphalt look with wide white stripes just like the one on Springfield, but doesn't include

that crossing's flashing lights. No help for the distracted pedestrians, Crowell says.

While the CAVE is now open for business for other perceptual psychology experiments, the first such study done in it won't likely be the last for this line of research. Kramer and Neider discussed other potential experiments involving the CAVE and the treadmill, such as studies involving older adults.

"I would feel pretty confident in saying we will get more than one paper from this," Neider said.

HONORS & AWARDS

Hoddeson Named First Ever Siebel History of Science Chair

Beckman Institute faculty member **Lillian**

Hoddeson has been named as the first Thomas M. Siebel Chair in the History of Science at the University of Illinois at Urbana-Champaign.



Hoddeson is a Professor of History, a Research Physicist, a Campus Honors Program Professor, and an affiliate faculty member at the Institute. She is collaborating on a Beckman seed proposal with NeuroTech group member Thomas Anastasio that looks at analogies between social systems and neural systems in an effort to provide new perspectives for understanding both systems.

Antoinette Burton, Chair of the Department of History, said Hoddeson was the ideal choice for the first-ever Siebel Chair in the History of Science.

"Professor Hoddeson is internationally known and well-respected, not just among historians of science and but among physicists themselves - a rare enough accomplishment in the field," Burton said. "She has a global reputation, much of which has been linked to historicizing the production of scientific knowledge at Illinois and in the state more generally."

A faculty member in the Department of History at UIUC since 1989, Hoddeson's specialty is the history of twentieth-century science and technology, including topics such as modern physics, electronics, atomic weapons, the invention of alternative energy technologies, and oral history. She has written or edited seven books and more than 50 articles on the history of science or technology, including two prize-winning books, one on the history of the transistor (*Crystal Fire*, 1997) and another on the life of two-time Nobel Prize winner John Bardeen (*True Genius*, 2002).

Hoddeson has a Ph.D. in Physics from Columbia University and is a Fellow of the American Physical Society, the Center for Advanced Study at Illinois, and the John Simon Guggenheim Foundation.

Rogers Wins ACS Baekeland Award

Beckman Institute faculty member **John Rogers** has received another prestigious honor, earning the 2007 Baekeland Award from the North Jersey Section of the American Chemical Society.



The award has been given for the past 63 years on a biennial basis to an American chemist under the age of 40 years for what the group says are "accomplishments in pure or industrial chemistry, as characterized by the initiative, creativeness, leadership, and perseverance of the individual and indicated by published or unpublished evidence."

The Baekeland Award is just the latest in a string of honors for Rogers in the past year. He was also selected this past fall as a Fellow of the American Physical Society and in the spring was named as the winner of the Daniel C. Drucker Eminent Faculty Award by Tau Beta Pi, the national engineering honor society.

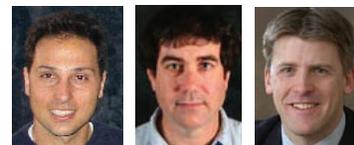
Rogers is a member of the 3-D Micro and Nanosystems group at Beckman, and a Founder Professor of Engineering, Professor of Materials Science and Engineering, and Professor of Chemistry at the University of Illinois.

The Baekeland Award is sponsored by the Union Carbide Corporation and consists of a gold plated medal and a \$5000 cash award. The award was established to commemorate the technical and industrial achievements of chemist Leo Hendrik Baekeland, the inventor of one of the first polymeric synthetics that helped to introduce plastics to the world, and to encourage younger chemists to emulate his example.

Past winners include John Hartwig, formerly of Yale and now at Illinois, and Charles M. Lieber of Harvard.

Three Beckman Researchers Earn CAS Appointments

Beckman faculty members **Eyal Amir**, **Richard Sproat**, and



Paul Kenis (pictured respectively, left to right) have been chosen as associates or fellows of the Center for Advanced Study for the 2007-08 academic year.

The announcement of the appointments said the CAS award "grants one semester of release time for creative work on self-initiated programs of scholarly research or professional activity." Six assistant faculty members were also selected as CAS Beckman Fellows, named after Institute benefactor Arnold O. Beckman. The CAS Beckman Fellow appointment "recognizes outstanding younger fellow candidates who have made distinctive scholarly contributions."

Amir, of the Artificial Intelligence group and a professor in Computer Science, was named a CAS Beckman Fellow. He will use the appointment to pursue the research topic of "Hard Problems for Artificial Intelligence, Easy Problems for Humans."

Paul Kenis of the 3-D Micro and Nanosystems group and a Professor of Chemical and Biomolecular Engineering was also named a CAS Beckman fellow. His research topic is "A Photocatalytic Fuel Cell."

Richard Sproat of the Artificial Intelligence group and Professor of Linguistics and Electrical and Computer Engineering was one of 12 University of Illinois faculty members named as a CAS associate. His research topic is "Multi-agent Simulation of the Evolution of Complex Morphology."

Protecting Value of Discoveries Can Be Tricky for Researchers

Going from discovery to the marketplace can sometimes require researchers to make the transition from scientist to entrepreneur. For some the change in perspective is more difficult, but for Beckman Institute researcher John Rogers the move was made easier by his academic background.

“It was natural for me because most of my graduate work, my Ph.D. work at MIT, was sponsored by a consortium of companies,” said Rogers, a professor and researcher who has won numerous awards both inside and outside of academia. He also holds dozens of patents that have commercial value, starting with technology patents arising from his work at MIT.

“There was always that sort of industrial, commercial aspect to my research,” Rogers said. “Participation in that kind of group highlights, more than otherwise might be the case, the importance of IP (intellectual property), the intellectual value of what you are doing. My case was a little bit different, but I think most campuses these days are pretty actively trying to educate researchers on the value of the IP that they may be creating and may not be aware of.”

The importance of intellectual property protection is a topic that not only more universities but also a growing number of researchers are focusing on. For some researchers the idea of commercialization, with its non-academic aspects like gauging marketplace potential and understanding the vagaries of the patent process, can be daunting. For those researchers, however, there is help on campus – and if they are in Beckman, that help can now be found on the fifth floor.

The University of Illinois has worked in recent years to strengthen its efforts to protect intellectual property developed here and facilitate technology transfer. The Research and Technology Management Office was created in 1995, and now goes by the title of Office of Technology Management (OTM). Their mission statement says that OTM



“(Researchers) are inventing things and their focus, of course, is on publishing and getting grants. Their focus is not on getting patents and commercializing. By being here at Beckman we think we can help them out there.”
— Steve Wille, OTM



Narendra Ahuja's self-aiming camera.

exists to “encourage innovation, enhance research, and facilitate economic development through the transfer of intellectual property.”

In order to reach out to more faculty members engaged in research with potential IP value, the OTM has now set up satellite offices, including one in room 5261 of the Institute. Steven Wille is a Senior Technology Manager for OTM who spends one day a week at Beckman, with help from an OTM associate on other days, in what is called “OTM in Residence at the Beckman Institute.”

“Researchers are very busy people,” Wille said. “They are inventing things and their focus, of course, is on publishing and getting grants. Their focus is not on getting patents and commercializing. By being here at Beckman we think we can help them out there.”

The OTM offers researchers help with identifying and evaluating IP, as well as guidance and education through the patent, licensing, and commercialization processes. Even someone as experienced with the process as Rogers uses their services because of the challenges involved in the commercialization process.

Rogers saw some of his earlier work evolve into a successful start-up company, and now he is a co-founder of a new company, Semprius, that is commercializing his discoveries in the areas of novel, high-performance semiconductor technology. And while his earlier experience at MIT made for a smoother transition to the commercial world, he admits it's still not an easy switch to make.

“It is really hard to take research out of the lab and make a real product,” Rogers said. “To make it robust and “manufacturable” and cost effective and competitive against entrenched technologies is incredibly difficult.”

The world of research and business, he said, are two very different places.

“When you move it into a company it's a

different environment, there are different pressures,” Rogers said. “There are pressures for revenue, so it’s hard to continue the kind of research and development that went into the initial development of the idea in that company environment.”

Rogers advises researchers to make sure their discovery is developed before taking it to commercialization, but both he and Wille say that it is good to start thinking about the patent process as soon as possible.

“More and more we are encouraging inventors to disclose to the OTM early, not later,” Wille said. “If we wait too long, we will probably lose the ability to patent because the invention will probably have been disclosed to the public in some way, which severely limits patentability.”

“I agree with Steven that sooner is generally better for filing patent applications, particularly because ideas in a patent application do not have to be reduced to practice to form the basis of valid claims,” Rogers said.

It’s easy to understand why the folks at OTM and Illinois officials feel that way. Mosaic, developed at the National Center for Supercomputing Applications (NCSA) at the U of I, is the Internet browser technology widely credited with making the Web accessible to non-computer types and, therefore, the wildly popular phenomenon it is today. After its development in 1992, the technology quickly reached the private sector, spinning off into companies like Netscape and earning untold millions in licensing agreements, only some of which is recouped by the University.

“Some is a very accurate word,” Wille said. “We are reaping some money from it.”

Wille said a major impetus for universities to protect IP emanating from their research labs largely began with the Bayh-Dole Act of 1980, which not only gave non-profit organizations like universities the right to retain title to intellectual property, but encouraged them to develop IP for the economic and societal benefits derived from that development.

“It said essentially that University inventions funded with government funds can remain the property of the University but the University has the responsibility to commercialize the inventions in order to create jobs in the U.S., or to create revenue streams for the government,” Wille said. “The Bayh-Dole Act is essentially a lever to make sure that we – our office, our Research Park, Illinois Ventures – develop methods to make sure that we take products and inventions from

the University and commercialize them.”

So how does that process work? Wille said that going from identifying IP to sending in a patent application is typically about a three month process. Because of the backlog at the United States Patent office, Wille said, the time between patent application and patent grant has “soared to about four years now.”

Once a potentially valuable IP is identified, OTM has services to help the researcher in applying for a patent, including locating the right patent attorney. Rogers said finding the right lawyer is a key part of the process.

“It’s really important that you work with an intellectual-property lawyer who has expe-

“When you move it into a company it’s a different environment, there are different pressures. There are pressures for revenue, so it’s hard to continue the kind of research and development that went into the initial development of the idea in that company environment.” — John Rogers

rience and understands how to draft claims,” he said. “Typically the best ones also have a Ph.D. in some discipline of science.”

Rogers said writing a patent application and writing a research paper are two completely different enterprises.

“You have to have a different mindset,” he said. “When you write a scientific paper you try to describe things as specifically and, generally speaking, as narrowly as possible to focus precisely on the system that you built and precisely on the way that it behaves.

“Writing a patent is much different because you have to think in just the opposite sense. You have to abstract as much as possible from the details of what you’ve done to broader concepts and generalizations of what you’ve done. So for a scientist that can be tricky because you tend to think in terms of specifics rather than generalities.”

As an example, Rogers described writing a patent for a fiber optic device he worked on at Bell Labs. Writing the research paper meant describing aspects of the device such as the electrode design, the temperature distribution, and how the device might be useful in a system.

“But if you look at the patent aspects, you look at it from an entirely different viewpoint,” Rogers said. “Instead of thinking about a fiber device that has a particular micro-heater on it, you think about any kind of cylindrical, curved optical structure that

has some form of electrode integrated with it and you could be applying magnetic fields, electric fields, heating, it could be many different kinds of combinations. So that would be the basis of a device level set of claims that would be very much a generalization of the concept that you demonstrated and may have little direct bearing to the particular device.”

Rogers said that patent claims can then become even broader than the specific technology, requiring multiple applications in order to “build a patent forest around your device.”

But for those who go through the process the reward can be great, both to the inventor and to the university. Wille said success stories like ECE Professor Nick Holonyak’s native oxide invention – used for making telecommunication lasers – are paying big dividends, while Rogers’ company Semprius is already bringing in money even though it was created just last year. The molecular imaging technologies for optical coherence tomography (OCT) developed by Beckman researchers led by Stephen Boppart are being promoted by OTM, as are nanotip technologies for nanolithography and scanning probe microscopy developed by Beckman’s Chang Liu.

The rewards don’t just come from revenue produced through commercialization. Wille said University donors and corporate sponsors are more likely to invest in future research if they can see tangible proof of their past investments.

“If they see that there are more patents coming out of here, they are more inclined to sponsor more and to donate more,” he said.

In addition to opening an office at Beckman, Wille said OTM will play host to receptions and seminars throughout the year featuring talks from people such as patent attorneys and campus officials about the IP process.

Even though the office at Beckman has only been open since this summer, they “already have seven ideas that will be going to disclosure within six weeks,” Wille said. “That’s besides about a dozen more that came out of what we call a specifically targeted patent day.”

Wille said that Beckman Institute Associate Director Van Anderson “is also out there beating the bushes and saying ‘hey, if you have any questions go talk to these people.’ He’s arranging the meetings and he’s been very helpful coordinating this.”

According to Wille, there were about 40 patents issued last year, and around \$5 million in royalty fees to the University last year. “Our goal is to increase both of those,” he said.

FACULTY PROFILE



Rohit Bhargava's research is helping to improve imaging methods for cancer detection.

Bhargava's Research Aims to Help People

Rohit Bhargava had fashioned a nice life for himself after earning advanced degrees in chemical engineering and polymer science. He had a solid position at the National Institutes of Health that provided financial security and a platform for doing interesting research. Bhargava also enjoyed the Washington, D.C.

lifestyle, but after a couple of years he found himself wanted something more.

"Things were really going well there, I had a staff position and the federal government is a really nice place to work,"

Bhargava said. "But I started thinking, what do I need to do long-term? I realized what I was missing was the interaction with students."

So Bhargava ended up at the University of Illinois as a Professor of Bioengineering and as a full-time member of the Beckman Institute's Bioimaging Science and Technology group. These days Bhargava continues doing research while also experiencing the joy of teaching.

"I think that's what drove me," he says of returning to academia. "I enjoy the teaching part, the working with students part. My grad students are doing well, winning awards, making good progress at publishing papers. I think part of the satisfaction with this job is to see them do well. Of course it's my research, I can do it here or at NIH, but it's also working with the young people here that's nice."

That interest in the human equation also drives Bhargava's research interests. He joined NIH to continue working to develop chemical imaging methods for medical and research applications. A few days later he heard a talk on problems in histopathology and realized his imaging approaches could be used to solve some of those problems. That took

him down a road that he believes will eventually lead to greatly improved imaging techniques and better diagnosis of disease.

"At first it was just a desire to solve a problem that it seemed like I could solve," Bhargava said. "But the more I examined it the more I realized that what I did not appreciate as an engineer is the human aspect of this problem. The minute you start to see that your work can have real impact on people you start to become really serious very quickly."

Bhargava's research group is currently focused on creating an automated method for determining whether certain kinds of prostate cells have the potential to cause life-threatening cancer. He said that current methods provide, at best, a correct diagnosis one-half of the time for the more than 200,000 men diagnosed with prostate cancer each year. Creating an automated technology with chemical imaging techniques could provide more accurate diagnoses for prostate cancer, and prevent unneeded surgery.

"The key question now is how do we determine who are those people who are going to get the truly risky kind of prostate cancer versus those who have incidental and age-related prostate cancer," Bhargava said.

Imaging techniques that include chemical information are a rapidly emerging aspect of

bioimaging, Bhargava said. By integrating chemistry with structural information, researchers and technicians are able to look at how structures change over time when they evaluate an image. While the original chemical imaging methods were created elsewhere, Bhargava's work has taken the technology to a new level, creating techniques that allow imaging in a matter of seconds as opposed to older methods requiring several days.

"It's a very powerful technique to look at both chemistry and structure simultaneously and our group pioneered this technology," Bhargava said.

Bhargava finds satisfaction in that research accomplishment and in the fact his students are winning awards and publishing papers. Now what he would like to see is the technique for greatly improving diagnosis come to fruition.

"I think that is the most rewarding thing, that in a few years you could truly help people and do research that's not isolated," Bhargava said. "The scientific aspects are interesting and very satisfying intellectually, but the real payoff I think is the fact that you can truly help people."

"The scientific aspects are interesting and very satisfying intellectually, but the real payoff I think is the fact that you can truly help people."

— Rohit Bhargava



A SAMPLING OF BECKMAN INSTITUTE RESEARCH RECEIVING NATIONAL MEDIA ATTENTION:

NANOSCALE INKJET PRINTING

September 13 — A new type of inkjet printer has been developed that can precisely print dots of various materials just 250 nanometers in diameter. The inkjet printer could make it possible to rapidly synthesize complex nanoscale structures out of various materials. "The goal is to do manufacturing," says John Rogers, a Beckman researcher and U. of I. professor of engineering. The new printers can use a broad range of materials for manufacturing novel devices, from plastic electronics and flexible displays to photovoltaic cells and new biomedical sensors, Rogers said. *Technology Review*

EXERCISE AND THE BRAIN

September 13 — "Across all ages, we see cognitive benefits related to fitness," says Charles Hillman, a Beckman affiliate and professor of kinesiology and community health at Illinois. *The Daily Cardinal*

ENGINEERS URGED TO POOL THEIR KNOW-HOW

September 10 — Pierre Wiltzius, the director of the Beckman Institute for Advanced Science and Technology at Illinois, said successful interdisciplinary research required the physical proximity of staff, students and facilities. The cozy cafeteria in his center was often where ideas formed. *South China Morning Post*

IMPROVED E-JET PRINTING PROVIDES HIGHER RESOLUTION AND MORE VERSATILITY

September 6 — By combining electrically induced fluid flow with nanoscale nozzles, researchers at the University of Illinois, including Beckman faculty member John Rogers, have established new benchmarks for precision control and resolution in jet-printing processes. *U of I News Bureau*

CAN EXERCISES HELP US HOLD ON TO OUR MEMORIES?

September 4 — Doctors tell us to exercise our bodies, but what about our brains?

Crosswords are said to help with memory, and new video games promise to give your mind a workout. Does any of it work? Art Kramer, of the Beckman group leader for the Human Perception and Performance group talks about the memory programs and the science behind them.

NPR Talk of the Nation

EXERCISE AND ALZHEIMER'S

August 29 — Elizabeth Stine-Morrow, professor of psychology and in the Beckman Institute, says age-related changes in the brain can make some activities, such as reading, require more effort. “But effort is a good thing. Every time you allocate effort, it increases your capacity to do that thing in the future. And that becomes even more important as we get older.”

St. Petersburg Times

NAHRSTEDT TO HEAD TEAM STUDYING ADVANCED MULTIMEDIA

August 27 — U. of I. computer science professor and Beckman Affiliate Klara Nahrstedt was picked as chairman of one of the newest of the Association of Computing Machinery's famous special interest groups, this one focusing on advanced multimedia applications.

Campus Technology

SLIPS, STUMBLES AND VERBAL BLUNDERS

August 24 — Gary Dell, a cognitive scientist at the Beckman Institute, says that the brain, in speech mode, electrically activates linked words, sounds and meanings that occasionally overlap and produce not only errors like “every crook and nanny” but also conceptual reversals such as saying “open the door” when you mean

“close the door,” a problem created because the idea of “openness” has registered on the brain and intruded on speech.

The New York Times

CAMPTOTHECIN

August 21 — Chemist Jianjun Cheng, a visiting researcher at Beckman and professor of materials science and engineering at Illinois, used a chemical linker to attach camptothecins, a chemical derived from the Chinese shrub with cancer-fighting properties, to a polymer. The result was a dry powder that, when mixed with water, assembled into particles that were just the right size.

Peninsula Online

SLEIGHTS OF MIND

August 21 — Inattentive blindness research conducted by Beckman faculty member Dan Simons was highlighted at the annual meeting of the Association for the Scientific Study of Consciousness.

The New York Times

SELF HEALING PLASTIC

August 17 — A team led by Kathleen Toohey, a postdoctoral researcher at Beckman, is experimenting with a new form of self-healing materials that uses a kind of circulatory system to carry the healing agent.

SciCentral News

'DUMBLEDORE THEORY' OF AGING PRESENTED

August 7 — According to Beckman researcher and U. of I. educational psychology professor Elizabeth Stine-Morrow, aging adults may have more control over their “cognitive vitality” than they may realize.

UPI

NEURONS GROW LESS DENSE

August 7 — Neurons communicate by altering the chemical environment between them. However, these chemicals also keep neurons alive and so, until now, neurons could be kept alive only at high densities in vitro, making it difficult to measure the changes in the chemicals between individual cells. In response to this, a group led by Beckman affiliate Martha Gillette has developed a method of culturing neurons at low density.

Chemistry World

AGING ADULTS HAVE CHOICES WHEN

CONFRONTING PERCEIVED MENTAL DECLINES

August 2 — Aging adults may joke about memory lapses and “early Alzheimer's.” They may worry when they can't understand a drug plan or lose track of the characters in a novel. But they have more control over their “cognitive vitality” than they may realize, says Elizabeth Stine-Morrow, a Beckman researcher and professor of educational psychology at the University of Illinois, who has spent 20 years studying learning throughout the lifespan.

U of I News Bureau

SILICON MEMBRANE MIMICS BIOLOGICAL IONS

July 13 — A semiconductor membrane designed by researchers at Illinois led by Beckman faculty member and electrical and computer engineering professor Jean-Pierre Leburton could offer more flexibility and better electrical performance than biological membranes.

United Press International

