SYNERGY

BECKMAN INSTITUTE FOR ADVANCED SCIENCE AND TECHNOLOGY ISSUE 11 • WINTER 2009

COGNITION, AGING AND PREVENTING DECLINE

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COGNITION, AGING AND PREVENTING DECLINE

BECKMAN RESEARCHERS ARE LEADERS IN UNDERSTANDING AND FINDING SOLUTIONS TO COGNITIVE DECLINE

The Beckman Institute is home to some of the world's leading researchers in the area of cognition and aging. Beckman researchers are frequently go-to resources for media and others interested in a topic that will become increasingly important in the next few years as average life spans increase and Baby Boomers reach retirement age.

According to the Centers for Disease Control and Prevention, the proportion of the U.S. population aged 65 years and over is projected to increase from 12.4 percent in 2000 to 19.6 percent in 2030, with the number of persons aged 65 and over expected to increase from approximately 35 million in 2000 to more than 70 million in 2030.

Stressing the vital role exercise and other interventions such as diet can play in maintaining health over a life span has been a goal for numerous governmental and private agencies concerned with health. The role that cognition plays in a healthy lifestyle is becoming increasingly important as an aging population deals with issues of cognitive decline and disorders like Alzheimer's.

For Beckman researchers like Dan Morrow, Art Kramer, Ed McAuley, and Elizabeth Stine-Morrow, cognitive aging isn't just a topic for study; promoting cognitive health for older adults is part of their research mission. Their research lines focus on issues such as the benefits exercise can provide older adults or the effects that factors like social engagement can have on older adults. Their projects include promoting cognitively healthy choices, finding ways to encourage those healthy choices, developing intervention programs, and creating technologies to aid those suffering from cognitive decline.

Kramer and McAuley have been collaborating for years, studying fitness training and other interventions aimed at preventing cognitive decline. Stine-Morrow has created a program for studying the effects of social engagement on cognitive aging. Morrow studies how external aids can help working memory in older adults. All of their projects include objectives aimed at helping study participants and others concerned about their cognitive health.

In their video clips, the researchers talk about the theories behind their work, the results of their research, and the ways in which older adults can prevent or even mediate cognitive decline.

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DAN MORROW HUMAN PERCEPTION AND PERFORMANCE GROUP

Dan Morrow is a Professor in the Department of Human Factors, an interdisciplinary unit at Illinois that explores human behavior as it relates to systems. Morrow's innovative work currently focuses on two seemingly different areas of research: aviation and health care.

The common denominator for Morrow is the link between communication and cognitive processes in complex domains, with a focus on the roles of communication and cognition in older adults' everyday task performance.

Morrow's research doesn't just explore these issues; he also develops what are called external memory aids that seek to improve communication for older adults in task performance. In aviation that means he is developing external aids that would benefit pilots, especially older pilots who may have suffered cognitive decline.

In the healthcare field, Morrow has created a medication table (medtable) to help older adults with complex drug regimens adhere to their drug-taking schedule. Morrow was part of a National Institutes of Health-funded project that addressed the problems older adults have with self-care by improving the design of health care materials; the medication table came out of that project and now Morrow has improved the design and initiated clinical trials to study its effectiveness in a real-world setting.

In his video interview, Morrow talks about the importance of external memory aids and his development of a medication table for older adults with complicated drug regimens.

ART KRAMER HUMAN PERCEPTION AND PERFORMANCE GROUP

Art Kramer has studied the cognitive aging process for his entire career and is recognized as a leading researcher in the field. Kramer has been called upon as an expert on the topic by media such as CBS News and has testified before Congress about his research into the aging mind.

Kramer has been researching the effects of cognitive training and fitness training on human performance and brain function, with a focus on the effects those interventions can have on cognitive aging. Kramer's goals in this research area are aimed at understanding the cognitive aging process, but they also seek to promote healthy interventions like aerobic fitness and cognitive training. According to his Web site, the research involving the aging mind looks at "interventions that can capitalize on the cognitive and brain plasticity of older adults in an effort to enhance cognitive vitality throughout the life span."

Results from Kramer's studies have suggested that older adults who engage in aerobic exercise can slow and perhaps even reverse cognitive decline. One study, titled *Active Aging: Influence of fitness on brain and cognition*, found that "fitness training may serve as an effective intervention in delaying the process of cognitive decline normally associated with advanced aging. In particular, results suggest that regular exercise may help maintain and even enhance skills involved in executive control, such as planning, inhibition, and certain types of memory among older adults."

In his **video interview**, Kramer discusses the cognitive effects and benefits of exercise and other interventions.

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EDWARD McAULEY

HUMAN PERCEPTION AND PERFORMANCE GROUP

Edward McAuley does groundbreaking work at the intersection of psychology and physical activity, studying topics like exercise program compliance and the improvements in cognitive health that can result from a more active lifestyle. McAuley is head of the Exercise Psychology Laboratory at the University of Illinois, a lab which focuses on "the study of determinants and consequences of physical activity behavior across the life span."

McAuley collaborates frequently with Art Kramer in projects that look at the effects of aerobic fitness training on brain function and structure in older adults. He also collaborates with Beckman colleague Karl Rosengren investigating the influences of physical activity on psychological and motor functions and their relation to disability and function in older adults.

Part of the mission of McAuley's work, as he writes, is to emphasize "physical activity promotion across the life span and those factors that contribute to independent living and quality of life," with a research focus on "physical activity and well-being across the life span and the relationships among physical activity, social cognitive factors, function, disability, and quality of life."

McAuley said his research focus in this area is on the "behavioral science side of the problem, addressing issues of intervention compliance and retention from a social cognitive perspective."

In his **video interview**, McAuley talks about his studies of behavior as it relates to exercise.

ELIZABETH STINE-MORROW

HUMAN PERCEPTION AND PERFORMANCE GROUP

The cognitive benefits older adults can gain by adopting even a modest exercise program have been demonstrated in studies, but there are other interventions that could also prove helpful in preventing or even mediating cognitive decline.

Elizabeth Stine-Morrow, a Professor of Educational Psychology whose research at the Beckman Institute focuses on cognition and the capacity for learning throughout the life span, has devised a unique program for exploring the potential benefits older adults can get from engagement with others through a problem-solving team competition. After getting involved in Odyssey of the Mind through her own children, Stine-Morrow decided to apply the team problem-solving template in that educational program to her own research. For the past five years Stine-Morrow has been developing "Senior Odyssey", a program that works as both a research tool and intervention project for older adults.

Starting with a small grant from the National Institutes of Health (NIA) in 2004, Stine-Morrow has expanded Senior Odyssey into a $1.9M, five-year, multi-level research project and community-based cognitive intervention program for older adults. In the Senior Odyssey program, teams of adults age 60 and over participate in long-term problem solving over a 16-week session and compete in a tournament at the end of the session that is judged by the same criteria as that used in the international Odyssey of the Mind competition.

In her **video interview**, Stine-Morrow talks about the theory behind the Senior Odyssey program and what she has learned so far about its effect on cognition.

Beckman Institute faculty member Scott Carney, at far left, works with graduate students Robert Schoonover, center, and Budiman Dabarsyah. All three are either current or former Fulbright scholars.

Beckman's Fulbright Scholars

Faculty and students find exchange program rewarding

Scott Carney is a professor in electrical and computer engineering at the University of Illinois and a member of the Beckman Institute's Bioimaging Science and Technology group. Come January of 2009, he will add the title of ambassador for the United States to his resume.

When an offer came along to join a university in the Netherlands during his upcoming sabbatical, Carney said yes, but also decided to apply to the Fulbright Scholarship Program, described by one of its administrators as the "U.S. government's flagship academic exchange effort." Carney will be collaborating on research in theoretical statistical optics with a friend and colleague at the Vrije Universiteit (Free University) in Amsterdam, but he will also be going abroad with the type of perspective the Fulbright Scholar Program encourages.

"I'm very happy to be doing it and I'm very proud to be a Fulbrighter," Carney said. "It comes with things other than just the financial support. It comes with responsibilities to do these outreach efforts. They really expect us to be ambassadors in a sense. It was just a happy marriage, a good coming together of things."

Carney is just one of several current and former Beckman Institute faculty and students who have taken advantage of one of the Fulbright Program's many opportunities for scholarly exchange. Those opportunities include programs for students from the United States to study abroad, for foreign students and academics to study and do research here, for American academics to serve as visiting scholars and researchers abroad, as well as other programs for professionals such as teachers and engineers.

The Fulbright Program is sponsored by the United States Department of State, Bureau of Educational and Cultural Affairs. Established in 1946 through legislation sponsored by Senator J. William Fulbright, the State Department says the Fulbright Program is now a "mainstay of America's public-diplomacy efforts." Their Web site says that as of 2008, more that 285,000 Fulbrighters from over 155 countries have participated in the Fulbright Program since its inception, and that their worldwide alumni hold top positions in areas such as government, higher education, and law.

The program is administered by the Bureau and by cooperating agencies here and abroad such as the non-profit Institute for International Exchange (IIE). The IIE says the program "provides funding for students, scholars, teachers, and professionals to undertake graduate study, advanced research, university teaching, and teaching in elementary and secondary schools. The flagship international educational program sponsored by the U.S. Government, the Fulbright Program is designed to increase mutual understanding between the peoples of the United States and the people of other countries."

Carney sees the desire to increase mutual understanding between people and countries as part of his Fulbright mission. He added that the pursuit of science and the cultural exchange ethos of the Fulbright Program are completely compatible.

"The mission of the Fulbright Program is largely cultural but they view the knowledge base of mankind as part of our culture," Carney said. "I think it's a very enlightened view of what culture is. Culture isn't just folk songs and old stories; it's also what we understand about the universe."

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Though he has been to the Netherlands several times before, Carney said he believes living and working there will give him a new perspective on the country. He also thinks that sharing his knowledge with foreign academics and students will benefit everyone.

"I'm hoping to learn more about the day-to-day life, not just the barnstorming tourist view," he said. "I'm also hoping to make more long-term contacts scientifically and educationally. I'll be talking to high school students and I'll be working with graduate and undergraduate students at the Free University and those relationships are something I will carry with me out of the experience.

"And I'm looking to learn Dutch," he added. "I'm working on that. The whole idea is that the more we know about each other the better off we are."

Some other Beckman faculty members who have won a Fulbright scholarship include Kay Bock, Robert Fossum, and George McConkie.

Like Carney, Bock used a sabbatical and a Fulbright scholarship to do research in Amsterdam. Bock, a member of the Cognitive Science group at Beckman who studies language production, said the Fulbright experience was valuable for many reasons, especially as it applied to her research work. Bock said she went there specifically to work with a well-known researcher in her field.

"The director of the institute where I was is one of the pioneers in that field," Bock said. "We worked on a paper together that has had a lot of influence. It laid the foundation for lots and lots of things."

Bock also was called on to talk to Dutch high school students who were getting ready to travel to the United States as part of the Fulbright Program and she said she was happy to do it. "They asked so very little; it was virtually all benefit for me and no cost."

Bock said she gave many talks in Europe and made many contacts during her time as a Fulbright Scholar.

"The Fulbright made it possible to spend the whole year there," she said. "It was extremely valuable.

"And since then I've learned Dutch," she added with a laugh.

Fossum, who is now retired as a professor, spent a year at the University of Oslo on a Fulbright Scholarship while a Professor of Mathematics at Illinois. He said it helped his career in many ways, especially for the chance it offered to meet colleagues from all over the world.

"The advantage was I got to meet a lot of people, not just in Norway but all over Europe," Fossum said of the experience. "As a Fulbright Scholar it provided for travel to England and France so I met a lot of people. I think all of these contacts are what really made my career."

In June it was announced that a record number of University of Illinois students and recent graduates earned scholarships from the Fulbright U.S. Student Program for the 2008-09 academic year.

Two graduate students Carney is advising are "Fulbrighters": Robert Schoonover, an Illinois native who spent nine months in Amsterdam on a grant from the Fulbright U.S. Student Program, and Budiman Dabarsyah, a native of Indonesia who came over on the Fulbright's Foreign Student Program.

The Fulbright Program is sponsored by the United States Department of State, Bureau of Educational and Cultural Affairs. Established in 1946 through legislation sponsored by Senator J. William Fulbright, the State Department says the Fulbright Program is now a "mainstay of America's public-diplomacy efforts."

Schoonover said he was lucky in that he got to study under a sponsor, Visser, who was already known by his advisor, Carney.

"It was much better to send me away to someone we knew rather than just go somewhere and hope it works out," Schoonover said. "It turned out that Taco Visser at the Free University in Amsterdam was willing to take on a free student for nine months and he was a spectacular host."

Schoonover said there is no orientation program for Fulbright scholars.

"It was up to me to get myself ready for whatever it was I was getting into," he said. "Again, Professor Visser helped quite a lot with that.

"The important thing was to just be a good ambassador," he added. "Every year the Fulbright Program has a topic, so (the scholars) go to the high schools and they have American students talk with these Dutch students."

Schoonover said he is of Dutch descent, so he did a little genealogical sightseeing during his stay.

"Part of my family is from the Netherlands so I took a little field trip to go see where my family was from," he said. "It looked a lot like central Illinois. It was the same place. My ancestors moved across the Atlantic Ocean to live in the exact same area: a farming community with 800 people."

Schoonover described his Fulbright experience as a good one. He said he did it partly to gain a new perspective after having grown up in Illinois and earning his undergraduate and Master's degrees from the University.

"I think Scott could tell I was getting a little stir crazy being in Illinois," he said. "I was born and raised 150 miles from here so we talked about doing a study abroad thing. As we looked at the different programs it seemed like the Fulbright was the one that matched up most with that stage of my career. I think for the most part I came back pretty energized."

Dabarsyah earned his Master's at the University of Southern California but returned a dozen years ago to teach at a university in his home country. He said the Fulbright Program is well-known in Indonesia as an opportunity for studying abroad through advertising and mailing lists.

"And some of the Fulbright jury members in my county are also faculty members at my university," Dabarsyah said. "They encouraged me to apply."

Dabarsyah said he wanted to advance his academic career and the Fulbright Program was a good way to do that.

"The thing about the Fulbright Scholarship is it gives you an opportunity to enter a very good school," he said, adding with a smile, "and a very expensive one."

Dabarsyah said the Fulbright Scholarship covers most of his tuition and only asks in return that he takes his education "as seriously as possible.

"Just concentrate on my education. After that I must go back to my country and network, and help the friendship between the U.S.A. and my country."

Carney said he won't be teaching while in the Netherlands but will be doing research and educational outreach efforts. He also is looking forward to experiencing life in the Netherlands firsthand, for a number of reasons.

"It's a sort of concentrated Petri dish of what's happening in Europe and in the world at large," Carney said. "So it's a very interesting time to see what's happening in Holland. I think Holland is really the country to watch. I'm hoping to learn a lot. We're planning on living right in the heart of it, right in downtown Amsterdam, so it should be an interesting experience."

Beckman Team Takes Third at Star Challenge

The kind of intense team contests found in sporting events on campus aren't usually played out in academic competitions. But the Grand Finals of Star Challenge, an international multimedia search competition worth $100,000 to the winning team, took on a decidedly competitive tone. And Beckman Institute researcher Tom Huang sounds just like a coach when talking about his team's effort.

The University of Illinois team, headed by Huang and fellow Beckman faculty member Mark Hasegawa-Johnson, was the only entry from the United States to reach the Grand Finals held in Singapore in October and was ahead of the other four finalists going into the last round of competition. Prior to the trip to Singapore, Huang sounded like a coach who was just happy to reach the finals. After the Illinois team took home the Bronze medal, it was clear they had their sights set on first place.

"The one thing I want to emphasize is that we entered this kind of competition mainly to learn, not really to win," Huang said prior to the finals. "Winning means having some luck, especially this final competition, which really depends on luck."

Afterwards, the spirit of competition was evident.

"We are happy and I'm really proud of the team but of course we were disappointed," Huang said.

Student members of the Illinois team at Star Challenge in Singapore were (left to right) Jui Ting Huang, Dennis Lin, Xi Zhou, Yuxiao Hu, Xiaodan Zhuang, and Zhen Li.

The sort of team competition found in Star Challenge is somewhat unusual in academia. Huang said he and his students participate in other evaluations but Star Challenge was different because of the teamwork it required and because of its competitive nature – the Grand Finals was a two-hour, on-stage event with music playing over loudspeakers and a crowd of interested onlookers.

"My students work together but not to this extent," Huang said. "It was a very intense experience.

"There was an audience and an emcee who was very dramatic and trying to make it exciting," he added with a laugh. "With all the music in the background it was a little distracting."

Star Challenge was created as part of the opening of Fusionopolis, the new research and development arm of Singapore's Agency for Science, Technology and Research (A*STAR). There were 56 teams from around the world originally entered in the competition, which over a nearly 10-month process required entrants to create algorithms that could search Singapore television shows for specific audio and video segments.

The Illinois team went by the name UIUC-YX and, in addition to Huang and Hasegawa-Johnson, included students Jui Ting Huang, Dennis Lin, Xi Zhou, Zhen Li, Xiaodan Zhuang, and team leader Yuxiao Hu. Although they were leading after the qualifying rounds, the Illinois team was thrown a curve in the last round: Second Life, the user-generated virtual world, was going to be a part of the Grand Finals. At a planning meeting for the finals held a few days before they left, members of the team were asked how many had used Second Life. Muted laughter was the only response.

"It was a complete surprise," Huang said of the Second Life angle. "We have just started to look into it."

But as it turned out, the biggest obstacle in the Grand Finals was the mix of languages found on Singapore television. The mission in the finals was to find specific sounds such as phonemes or words in the audio track of the videos.

"You want to find segments where the audio contains these phonemes but it could be spoken by anybody," Huang said. "The second query was a segment of speech. You want to find video segments containing these words but spoken by different people. The query was usually very short, one word or two words, so it was difficult to find matches."

Add in the fact that members of the team didn't speak some of the languages and that made the task even harder. Despite that, the Illinois team led right up until the end. Students took turns with the tasks during the two-hour competition, with three team members on stage at a time.

"I did not go up on stage but Mark did," Huang said. "We changed people all the time, depending on the task. They give the score along the way and 15 minute before the end we were leading. We stayed No. 1 until about five minutes before the end."

Other teams contributed answers near the end, with a team from the National University of Singapore taking the top prize. Despite the heated competition, Huang said his team members weren't nervous, unlike his wife Margaret, who also made the trip.

"They were too busy to be nervous," he said. "Actually my wife was the most nervous person. I don't know why but she was really, really intense."

Huang said that a major difference between the Grand Finals and the first three rounds was that in the earlier rounds all of the search methods were totally automatic (no human intervention) while in the Finals, the contestants were allowed to listen to the audio and look at the video, giving an advantage to teams that were familiar with the languages and the TV program contents or formats.

Even though the competition was exciting, the purpose behind

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Star Challenge was scientific, both for the sponsors and the participants. The competition was aimed at advancing the next generation of multimedia search engines, ones that don't require tagged text.

The Illinois team came home with more than a third-place finish. For professors Hasegawa-Johnson and Huang, Star Challenge was a great opportunity to evaluate their search algorithms.

"As far as I'm concerned I'm very happy and quite proud of the team that we were in the final five, especially that we ranked overall No. 1 in the qualifying round," Huang said. "That's the real test of the algorithms.

"The main reason (we did this) is that we have been working on basic research and we always want to see how the algorithms will work in a more realistic setting. In this competition the data is real broadcast TV."

The Illinois team at Star Challenge is pictured in Singapore. Front row, from left to right, are team faculty leaders Mark Hasegawa-Johnson, Tom Huang (and his wife Margaret), and students Dennis Lin, and Yuxiao Hu. Second row, from left, are student team members Xi Zhou, Jui Ting Huang, Xiaodan Zhuang, and Zhen Li.

The opportunity to test his group's algorithms is also why Hasegawa-Johnson, who has a research line involving audio-visual speech recognition, joined the effort.

"The way they originally framed the task was exactly – at least from an audio point of view – the kind of work that I've been trying to move my group toward, that is multi-lingual recognition, language independent speech recognition," Hasegawa-Johnson said. "And I think similar (to what Tom said) we want to work with realistic, real-world data.

"In fact, the longer term goal is that the information retrieval system we developed for this will be a test-bed for algorithm development for a few years to come."

Huang said the competition also was good for his students.

"It helps in several different ways," he said. "One is the students really work together as a team, so I think it was a good experience for them. In trying to solve these problems, along the way not just in the finals, we looked at different algorithms so we learned a lot about what works and what doesn't work."

The team also had time for some fun during their trip. Chip Zukoski, former Vice-President for Research at Illinois, is currently serving as Chairman of A*STAR's Science and Engineering Research Council. Huang said Zukoski had a dinner party for the five teams at Star Challenge and attended the finals.

Despite doing so well in the competition and the experience gained from it, Huang isn't sure if he would be up for another Star Challenge.

"I don't know," he said with a laugh. "It was a lot of investment."

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Photo credits: Star Challenge photos, courtesy Yuxiao Hu; Ashutosh Garg, courtesy Ashutosh Garg; all others, Beckman Institute.

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The Right Search Engine

From Google to a Start-up, Ashutosh Garg Says Beckman, Illinois Helped Lay a Foundation

When Ashutosh Garg went looking for the right place to earn a Ph.D. and do graduate research, he found them at the University of Illinois and the Beckman Institute's Image Formation and Processing (IFP) group working with faculty member Tom Huang. Garg said those experiences paved the way for him to land a job, and succeed, at one of America's most well-known information technology companies. Garg spent more than four years as a research scientist at Google, working on important projects for that Internet search titan, before deciding to take the bold step of starting his own company. Garg now runs a company that is developing technology for gathering and managing online content. Beckman's Office of External Relations recently asked Garg about his time here, his stint at Google, and about the pitfalls of running a start-up company.

You have founded your own start-up company after working for Google. Why did you decide to leave a successful company and go out on your own? What do you see as this company's niche in the business world?

Google is a great company and I thoroughly enjoyed working over there. However, starting your own company not only provides you with the freedom to pursue your ideas, it also provides a great learning environment. You get to conceive a product from scratch, understand user needs, take it to market, and iterate based on customer feedback. The focus of this company will be on aggregation and management of online content. The Web is suffering from content overload. There are thousands of Web pages which provide the same or similar information. Instead of the end user going through all these pages, can we provide an environment that will allow consumers to get to what they are looking for efficiently?

What was your job title at Google, how long were you there, and what did your job entail?

I was Staff Research Scientist at Google. I was there for 4.5 years. At Google, my job was to identify new technologies that can either help existing products or become the launching pad for new products.

You graduated with a degree in electrical engineering from the Indian Institute of Technology in New Delhi with a focus on gesture-based remote visualization. Could you tell people about your background in India and how you got interested in the academic path you took?

I grew up in a small town near New Delhi. For my undergraduate degree, I went to IIT Delhi. During my tenure over there, I did a project that involved controlling a robot using gestures. This project exposed me to the world of computer vision and machine learning. I was extremely fascinated by this area and developed a keen interest for technologies that can help humans do their job better.

How did you end up at Illinois?

Prof. Huang is a leading authority on Computer Vision and the Beckman Institute is probably the best place to do interdisciplinary research. During my trip to Urbana-Champaign in 1997, I had the pleasure of meeting Prof. Huang and was very impressed by the work going on in the IFP group. At that point, the choice was simple.

At Illinois your advisor for your M.S. was Tom Huang and Professor Huang and Dan Roth were advisors for your Ph.D. You also had papers with Professor Huang. Could you talk about how they influenced you and helped you, both academically and from a research point of view?

I am and will always be indebted to Prof. Huang and Prof. Roth for not only helping me in my professional life, but also for providing an environment which helped me grow as a person. The environment of the IFP lab is very stimulating. Prof. Huang and Prof. Roth, while introducing me to important problems, also gave me freedom to pursue independent thinking. Both professors were always available for technical discussions, to help refine the problem, and to guide me toward a solution.

Ashutosh Garg.

What was your research focus while you were getting your degrees and working as a research assistant here?

My research was primarily focused on machine learning and computer vision. I had the good fortune of doing multiple internships and thus getting an exposure to industry at the same time. As a balance, I was mainly involved in theoretical work while at UIUC and applications during the various internships that I did. Speaker detection, event detection, speech recognition, and gene annotation are some of the applications I worked on during my internships. While at the University, I was involved in developing theoretical understanding of machine learning algorithms. The title of my thesis was "Learning in high dimensional spaces."

You won the Robert T. Chien Award for excellence in research from the Electrical and Computer Engineering Department while you were here. Was that a big honor for you? Are there one or two papers from your time here that stood out and helped your professional career? Did you apply any of that that research work to your job at Google or with your current company?

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Yes! Indeed it was a great honor. I am very proud of it. I won't say that there was a particular piece of work from my Ph.D. thesis that became the cornerstone of my work at Google. However, the learning I gained during this time has been the foundation to all the work I did. At Google, I was the architect of the largest online personalization system. I couldn't have done it, had I not studied what I did during my Ph.D.

Could you explain to lay people how what you did at Google or what you are working on with your start-up company could someday have an impact on their lives?

At Google I was involved in various projects. I led the efforts to improve the ranking of product search, and later on was part of the team working on our core search system. I was also the architect of the Personalization system and Google Custom Search.

What are the most exciting and the most intimidating aspects of founding a start-up company? Where do you hope this company will be in 10 years?

Every day is full of new ups and downs. Convincing people what you are doing is the next big thing and getting the right team in place are some of the most intimidating things. Feeling that what you are doing will get used by millions of people is extremely exciting. I don't know where my company will be in 10 years. However, I do hope that it will be a valued addition to the lives of millions.

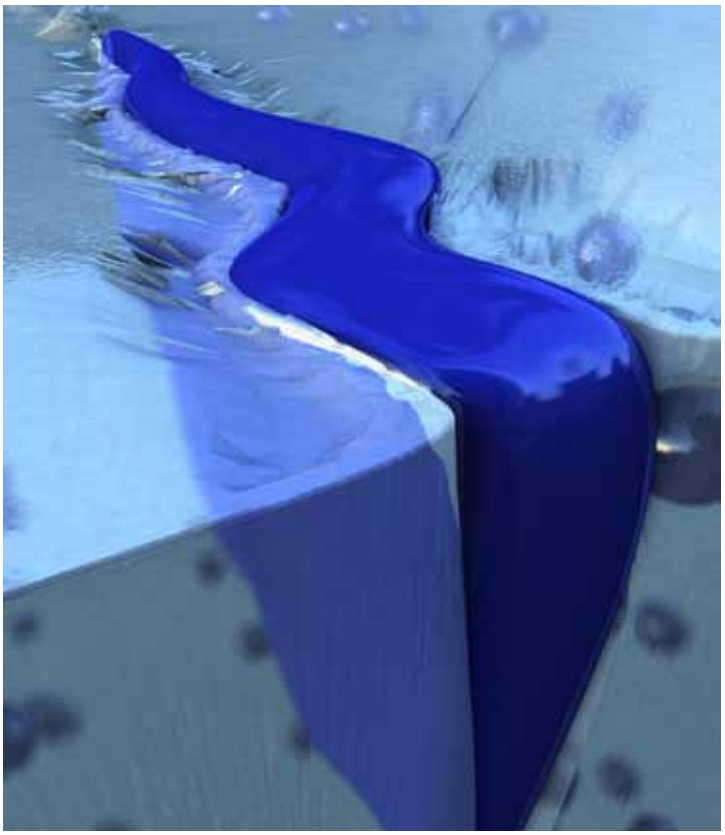
What do you remember most about your time at Illinois and being at Beckman? How does the life of a start-up company founder living in California compare to your time in Illinois?

Time spent in Urbana-Champaign was the best time of my life. Working on exciting problems, learning from the best teachers, was just awesome. I also had the good fortune of staying with my brother (Paritosh Garg). I owe all my success to him.

If you had any advice for current students what would it be?

Be aware of the real world. Many times, we get too involved in what we are doing and lose sight of industry. While theoretical work is the right thing to do during a Ph.D., a little knowledge of industry can take you a long way.

Second International Self-Healing Conference set for Chicago



The rapidly emerging field of self-healing materials will be spotlighted at the Second International Conference on Self-Healing Materials, set for June 28-July 1, 2009, in Chicago.

The Web site (http://conferences.beckman.uiuc.edu/ICSHM2009) for the conference states that its scope will encompass "all classes of self-healing materials, including polymers, ceramics, metals, and composites, while biomaterials and bio-inspiration serve as model systems that guide research in the emergent field of self-healing."

The conference will feature focus sessions, special symposia, and submitted abstracts. General topics include areas such as self-healing polymers, microvascular systems, and self-healing coatings and paints, while the special symposia are being organized in a variety of areas, including self-healing supramolecular polymers, numerical analysis tools for self-healing, and mechanochemically active polymers.

"The ICSHM provides a high-level international platform for the field of self-healing materials. We expect to attract a diverse, multidisciplinary group of scientists and engineers from around the world, not only reporting on the current state-of-the-art, but also the future of self-healing materials systems," said Scott White of the University of Illinois, the Beckman Institute, and general co-chair of the conference along with Ian Bond from the University of Bristol in England.

The deadline for abstract submission is Jan. 5, 2009, while early fee registration can be done until March 4, 2009.

The first International Conference on Self Healing Materials was held in the Netherlands in 2007 and included more than 200 self-healing researchers from around the world.

FACULTY PROFILE

"I think that exercise research is fascinating because of the fact that we know there are these healthy, beneficial effects provided to skeletal muscle following exercise but we don't know the process by which they occur. I enjoy getting my mind into the cell and seeing what is responsible for some of these changes."

– Marni Boppart

Marni Boppart's approach to life and work is probably hereditary. Her father flew F-4 jets on low level reconnaissance wartime missions; she was an Air Force kid who grew up to be an Air Force officer.

"I was on airplanes since I was about two weeks old," Boppart says with a laugh. "I was always exposed to the flying environment, so I love altitude."

Boppart didn't become a jet pilot, but she did serve in the Air Force as an aerospace physiologist, earned her free fall parachute jump wings, and has taken occasional forays into daredevil activities like hang gliding and repelling. But for Boppart, her time in the Air Force was more about science.

"I took flying lessons and enjoyed my career in the Air Force, but my primary interest has always been in the biological sciences," she said. "Becoming an aerospace physiologist was a nice way to balance my interests in adventure and the sciences."

Boppart's time in the Air Force served two other purposes that eventually led to her current position as a faculty member at Illinois and the Beckman Institute. While serving, she nurtured an interest in the science of exercise physiology and she also met her future husband, fellow professor and Beckman researcher Stephen Boppart.

"Stephen and I were a natural fit for each other because we are both kind of curious," she said. "I knew that he was going on for his Ph.D. and I was interested in going on for my doctoral work as well."

Earning her Sc.D. in Applied Anatomy and Physiology from Boston University, Boppart later did research at Harvard Medical School and was fortunate, she said, to land a post-doctoral position at the University of Illinois when Stephen joined the faculty here in 2000.

"We both have family here in the Midwest, and of course, this is one of the best engineering schools in the nation," she said. "I got very lucky because there was a faculty member (Stephen Kaufman) in cellular and developmental biology who was doing work that I was very interested in, so I worked with him on and off for a total of six years."

Boppart eventually became an Assistant Professor in the Department of Kinesiology and Community Health at Illinois and joined the Beckman Institute as a full-time faculty member in the Bioimaging Science and Technology group. Her research interests lie broadly in the field of exercise science, and include areas such as cellular biomechanics, cell signaling, and the role certain proteins can play in the protection of skeletal muscle from injury, disease, and aging.

"We are interested in understanding how muscle cells transmit mechanical forces into chemical signals that increase muscle integrity and structure and how these signals are involved in remodeling the tissue," she said of her work.

Boppart is interested in topics like how molecules within a muscle cell sense forces that occur during exercise.

"We know that if a muscle cell is stretched in culture, the cell will enlarge or hypertrophy," she said. "The same phenomenon occurs when we contract our muscles during exercise."

These processes are at the heart of why Boppart does research.

"I think that exercise research is fascinating because of the fact that we know there are these healthy, beneficial effects provided to skeletal muscle following exercise but we don't know the process by which they occur," Boppart said. "I enjoy getting my mind into the cell and seeing what is responsible for some of these changes."

Boppart's research mission isn't just based on scientific curiosity; she wants to see her work have an impact on people.

"The long term goals of my research are, number one, I would like people to have an impetus to exercise," she said. "If they understand that exercise is truly beneficial at a biological level then they might say, yes, I will go out and exercise. But if that's not possible and is unrealistic then we need to develop interventions in order to prevent that loss of muscle and function that occurs primarily with aging."

One possible intervention that Boppart is currently working on involves stem cells.

"My research has shown that with exercise there is an increase in a specific stem cell population to skeletal muscle," she said. "So far what we can tell is that these stem cells secrete agents that are important in mediating an anti-inflammatory effect within the muscle. So they may be very beneficial for the health status of muscle. I think what I would like to see, instead of drug development for prevention of the loss of muscle, is the development of injectable stem cell therapy."

Her current research lines involving exercise complement a deep personal interest in exercise, healthy living, quality aging, and the outdoors.

"Exercising allows me to focus while trying to accomplish many tasks," she said, adding that her exercise workouts involve "anything outdoors, running, hiking, biking, just to breathe the air and commune with nature. I think it's essential for the human spirit to do that on a daily basis."

HONORS & AWARDS

Gratton Elected SPR President

Beckman Institute researcher **Gabriele Gratton** was elected President of the Society for Psychophysiological Research at the organization's meeting in Austin, Texas. Gratton replaces Monica Fabiani, his Beckman colleague and his co-director at the Institute's Cognitive Neuroimaging Laboratory (CNL), as SPR President. In addition, Kara Federmeier of the Beckman Institute was elected to the Society's board of directors.

Greenough Given FRAXA Award

William Greenough, Co-chair of the Beckman Institute's Biological Intelligence research theme, has been honored by the Fragile X Research Foundation (FRAXA) with its 2008 Dedication Award. Greenough was given the honor at the FRAXA Research Foundation's Investigators Meeting in Durham, New Hampshire, in September. Researchers from around the world attended the meeting, all of them with the common goal, said FRAXA's Medical Director, Michael Tranfaglia, "to share, collaborate and publish," in order to find effective treatments and a cure for Fragile X syndrome, the most common inherited cause of mental retardation and autism. Greenough was honored at the meeting's opening reception for his "longstanding, unwavering commitment to Fragile X translational research and to strengthening the Fragile X scientific community."

Leburton Named Fellow of Institute of Physics

Jean-Pierre Leburton has been named a Fellow of the Institute of Physics. Leburton, head of the Computational Electronics group at Beckman, was named a Fellow of the Institute of Physics (IOP) for his career work in areas such as quantum wires, quantum dots, spintronics and issues related to semiconductor physics, among other topics.

Granick Wins Polymer Physics Prize

Beckman Institute researcher **Steve Granick**, a member of the Institute's 3-D Micro- and Nanosystems group, was awarded the Polymer Physics Prize of the American Physical Society. Granick is also a Founder Professor of Engineering at the University of Illinois and holds appointments in the departments of Materials Science and Engineering, Physics, Chemistry, and Chemical and Biomolecular Engineering. Granick was given the Prize for his "pathbreaking and elegant experiments that elucidate the structure and dynamics of polymers and liquids confined by surfaces." The Polymer Physics Prize is considered one of the highest honors in physical polymer science in the United States.

Hoddeson Receives Award to Study Failure of Super Collider

Beckman Institute faculty member **Lillian Hoddeson** has won a $400,000 grant from the National Science Foundation and the Department of Energy for a study called "The Decline and Fall of the Superconducting Super Collider." Hoddeson, a Professor of History and the Thomas M. Siebel Chair in the History of Science at Illinois, will collaborate with Michael Riordan from the University of California in Santa Cruz on the study. The Superconducting Super Collider project, planned as the largest particle accelerator in the world, was funded by Congress in the late 1980s and later cancelled. Hoddeson's project will analyze the dynamics of how what would have become the largest scientific research project ever was cancelled from a "Big Science" point of view.

Freund Wins Frenkiel Award

Jonathan Freund, a member of the Beckman Institute's Autonomous Materials Systems group, recently won the François Frenkiel award from the American Physical Society's Division of Fluid Dynamics. According to the award announcement, the François Frenkiel award recognizes "significant contributions to fluid mechanics that have been published in Physics of Fluids during the preceding year by young investigators. The selection of the winner is determined by the Frenkiel Award Committee and is presented each year at the DFD Annual Meeting in November." Fruend was awarded the prize for his paper *Leukocyte Margination in a Model Microvessel* published in *Physics of Fluids, 19 023301 (2007)*. Freund is an Associate Professor of Aerospace Engineering at the University of Illinois. His research is in areas such as aerodynamic sound, large-scale parallel computing, molecular dynamics simulation of nanometer scale flows, and heat transfer in solids.

Rogers Named NSSEF Fellow

Beckman Institute researcher **John Rogers** has been named a National Security Science and Engineering Faculty Fellow. Rogers, a full-time faculty member of Beckman's 3-D Micro- and Nanosystems group, was one of six distinguished university scientists chosen as 2009 NSSEF Fellows.

Eisenstein Wins Sprowls Award

Beckman Institute Fellow **Jacob Eisenstein** was one of four winners of the 2008 George M. Sprowls Award for the best doctoral theses in computer science. The award is given by MIT's Computer Science and Artificial Laboratory in order to promote "excellence in computer science research and presentation." Eisenstein won for his work in "Gesture in Automatic Discourse Processing." Eisenstein earned a Ph.D. in Computer Science from MIT. His research focuses on non-verbal modalities such as gestures that supplement speech. At the Beckman Institute he is working on computational statistical models of the relationship between gesture, speech, and discourse with the goal of improving natural language understanding.

Braatz Chopsen as AAAS Fellow

Richard Braatz of the Beckman Institute and a professor in the Illinois Department of Chemical and Biomolecular Engineering has been named a Fellow of the American Association for the Advancement of Science (AAAS). Braatz, a member of Beckman's Computational Multiscale Nanosystems group, earned the honor for "distinguished contributions to the field of control engineering, particularly for the robust control of chemical, materials, and pharmaceutical processes." The AAAS (http://www.aaas.org/) is devoted to advancing science around the world and is the publisher of the journal Science, which has the largest circulation of any peer-reviewed science journal in the world.

RECENT BECKMAN INSTITUTE RESEARCH
IN THE NEWS

Beckman Researchers Study Relationship between Social Interactions, Gene Expression
November 6 – Beckman Institute researchers David Clayton and Gene Robinson collaborated on a study showing that the interaction between genes and behavior is a symbiotic one. A 1992 paper by Clayton on gene expression in the zebra finch songbird brain provided a "eureka" moment for Robinson, lead author of the current paper.

U of I News Bureau

Encouraging the Interdisciplinary Approach
November 6 – At public research universities, which are under pressure to keep central administration lean, the fund-raising apparatus is often highly decentralized by college, meaning inter-college initiatives may lack advocates or may conflict with collegiate priorities for development. As one approach, the U. of I. recently began assigning development officers to interdisciplinary institutes, says Feniosky Peña-Mora, associate provost and Beckman affiliate.

RedOrbit.com

Bugscope Video Featured in Pittsburgh Post-Gazette
November 5 – Beckman researchers Paul Braun and Nicholas Fang comment on research at the University of California Berkeley that created nanoscale particles that can self-assemble into various optical devices.

Technology Review

Molding of Tiny Structures on Curved Surfaces
October 28 – A high-tech start-up company launched in Greenville, N.C., is commercializing a manufacturing process developed by Beckman researcher and U. of I. mechanical engineering professor William P. King that allows the molding of microstructures and nanostructures on curved surfaces.

Greenville News

Powers Writes About Having Genome Sequenced
October 20 – Beckman Institute faculty member and acclaimed novelist Richard Powers explores the world of personal genetics in the latest issue of GQ magazine. Powers, a member of Beckman's Cognitive Neuroscience group, accepted the magazine's offer to have his whole genome sequenced and write about the experience – becoming one of only nine people in the world to go through the process – for the current issue.

GQ

New Recipe for Self-healing Plastic
October 15 – Beckman Institute researchers Nancy Sottos, Scott White, Jeff Moore, Mary Caruso, and Benjamin Blaiszik made a major improvement on the original design of their self-healing system by employing a less expensive, non-toxic solvent in the form of a simple food additive.

U of I News Bureau

Cognitive Benefits of Exercise Shown
October 15 – Art Kramer, a cognitive neuroscientist at the Beckman Institute at the U. of I., says there's substantial evidence showing the benefits of aerobic exercise and physical activity on such executive-control brain functions as task coordination, planning, goal maintenance, working memory and the ability to switch tasks.

US News and World Report

Ultrathin Silicon Solar Microcells
October 6 – Beckman researcher and U. of I. engineering professor John A. Rogers and colleagues have come up with a novel method for creating extremely thin solar cells that can be combined in flexible, even partially transparent, arrays.

New York Times

Simons Talks about Political Speech
October 6 – Beckman researcher and U. of I. psychology professor Daniel J. Simons talks about the difference in the way the presidential and vice presidential candidates answer questions during the debates.

Washington Post

Creating Synthetic Tissue without Optical Tweezers
October 2 – Researchers at Illinois have developed a new way to create synthetic tissue by fixing together tiles of cells without the use of optical tweezers. "The trouble with optical tweezers is that they kill things," says Gregory Timp, the U. of I. professor of electrical and computer engineering and Beckman faculty member who led the research.

Chemistry World

Under Pressure at the Nanoscale, Polymers Play by Different Rules
October 2 – William King, a member of the Beckman Institute's 3-D Micro and Nanosystems group who studies nanoscale polymer flow, has reported on polymer squeeze flow measurements made at unprecedented, short length scales.

U of I News Bureau

Amnesiacs Remember Grammar, Not Meaning of New Sentences
September 24 – In an experiment, researchers including Beckman faculty members Kathryn Bock and Neal J. Cohen examined which type of memory function contributes to syntactic persistence by comparing amnesiacs with a group of control volunteers.

PhysOrg.com

Developing Software for Estimating a Person's Age
September 23 – Beckman Institute researcher Thomas Huang is developing software that can estimate a person's age by examining their face. Huang, co-chair of Beckman's Human-Computer Intelligent Interaction research theme, said the software could be used in applications such as security control or for preventing underage drinking or tobacco purchases.

U of I News Bureau

Simulations Help Explain Fast Water Transport in Nanotubes
September 16 – By discovering the physical mechanism behind the rapid transport of water in carbon nanotubes, scientists at the University of Illinois including Beckman researcher Narayana R. Aluru have moved a step closer to ultra-efficient, next-generation nanofluidic devices for drug delivery, water purification and nano-manufacturing.

U of I News Bureau

Improving Medication Adherence
September 10 – Researchers at Illinois led by U. of I. psychology professor and Beckman faculty member Daniel Morrow found that when pairs of older adults filled out a written matrix listing medications and instructions by days and times to take them, they solved medication-related problems more efficiently and accurately, especially for the complex medication schedules increasingly common among older adults.

PhysOrg.com

BECKMAN IN THE NEWS
CONTINUED

Enhancing Water Transport through Carbon Nanotubes
September 3 – N.R. Aluru, a professor of mechanical sciences and engineering at the Beckman Institute, and Sony Joseph, who recently defended his doctoral thesis, have used computer simulations to explore a method by which water transport through smaller carbon nanotubes could be further enhanced.
PhysOrg.com

Malaria Detection
September 2 – Gabriel Popescu, a Beckman researcher and professor of electrical and computer engineering at Illinois, co-wrote a study that used two advanced microscopy techniques to show in unprecedented detail how the malaria parasite attacks red blood cells.
PhysOrg.com

New Method for Modeling Unsorted Data
August 28 – Beckman Institute faculty members Yi Ma and Robert Fossum report this month in the journal SIAM Review on a new modeling method for analyzing large amounts of unsorted high-dimensional data. They also report on successful applications of their method to real-world problems in computer vision, image processing, and system identification.
SIAM Review