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NATURAL SCIENCES UNDERGRADUATE NEWSLETTER

INSIGHT

This issue: Isaac Chavez, Q&A with Eric Anslyn,
Student Entrepreneurs and more

Letter from the Dean

The summer is a season for reflection at The University of Texas at Austin. We have the time to slow down a bit and celebrate the students who've just graduated—to thank them for what they've given to us for the last few years. We're also able to look forward to the energy that our returning and incoming students will contribute to what the college becomes into the future.

In this issue of *Insight*, the undergraduate newsletter of the College of Natural Sciences, we profile Isaac Chavez, who's both graduating—with a degree in physics and a published paper under his belt—and returning to the university as a doctoral student in the fall. We talk to Dr. Eric Anslyn, who's combining his love of teaching and his pioneering research (not to mention his interest in wine) by leading a class of undergraduates in the Freshman Research Initiative.

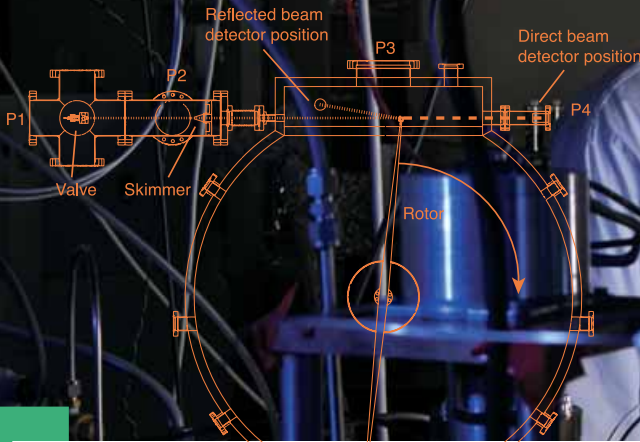
We also highlight our Dean's Honored Graduates, the winners of our 2007 Undergraduate Research Forum, and a group of exceptional students who are changing the way the university supports disabled people as they navigate a world built by, and for, the ambulatory.

To those who've left, we'll miss you, and to those who are returning, or who we're meeting for the first time, we'll see you soon.

With all best wishes,



Mary Ann Rankin, DEAN

STUDENT PROFILE:
ISAAC CHAVEZ

he undergraduate career of Isaac Chavez, which ended this May when he graduated with a bachelor of science degree in physics, began unremarkably. His freshman year was devoted primarily to having a good time and to absorbing the culture shock of moving to Austin.

“Coming from El Paso, let’s just say I experienced Texas for the first time in Austin,” he says. “My high school was 99% Hispanic. I grew up a mile from the border. It’s not quite Mexico, but it has the same culture, the same feel, the same vibe as Mexico. Coming out here—it’s totally different, a different world. The first time I heard someone speaking Mandarin Chinese, on the elevator in the dorm, I was like ‘whoa.’”

Chavez did fine in his classes—mostly Bs—but doing fine was too easy for him, and by the end of his first year he decided that he wanted to do better than fine. He applied for a job with the Texas Interdisciplinary Plan (TIP) Mentor Academy and was hired as an academic peer mentor and tutor for first-year students taking classes in physics and calculus.

He also began doing research in the lab of physics professor Mark Raizen, whose course on electricity and magnetism Chavez had enjoyed. “He approached me first,” says Raizen, “and although I typically don’t take on undergrads, because most experiments in my lab require a real full-time commitment that an undergrad can’t usually give, he was very persistent, and I finally agreed, which was a very good decision on my part.”

For the next three years, Chavez’s life revolved around his studies, his tutoring, and his research. It was a busy life.

“There were some times when I sort of wanted to switch out of physics,” he says. “I’d be studying at three or four o’clock in the morning, and I’d be like, ‘Man what am I doing?’ I could have been asleep. I could have been out having a good time, but then I thought, ‘What am I going to switch to that will keep my interest?’”

Working as a mentor with TIP offered Chavez a way to

keep an even keel, and it gave him a chance to use his expertise in math and physics, and his personal experience of adjusting to college, to help out younger students.

“I’ve always had someone in my life to help me through,” he says, “and although maybe I can’t be that one person who’s going to make that difference in their lives, at least I can be that person who can make things a little easier for them. I know how tough college can be. I’ve had some mentees who’ve had similar backgrounds. They’re from border towns, they’re low-income, and they were a little nervous coming out here, and that’s why they had me as a mentor, to reassure them that they can do it.”

In Dr. Raizen’s lab, Chavez was able to deploy both his academic knowledge and his building skills—honed during summers working construction with his father—to assist the research into the slowing of a beam of supersonic helium atoms. He also pursued an independent project to develop a new type of position-sensitive laser beam detector that can detect nano-particles on time scales more than two orders of magnitude faster than commercially available detectors.

The technology, says Raizen, will be valuable to scientists interested in a variety of questions that, until now, they haven’t had sufficiently sensitive tools to answer.

“The implications of this work are quite important,” says Raizen. “It’s his senior thesis, and of course he got an A on it, but that’s an understatement.” In addition to the two publications that will result from his thesis project, Chavez was also a named author on the article in which Raizen published the details of his pathbreaking “atomic paddle.”

After a month-long vacation this summer—his first vacation of that length in three years—Chavez will return to The University of Texas at Austin to begin his doctoral work under Raizen’s supervision. He’d like to stay in Austin, he says, for as long as possible. ❖

DEAN'S HONORED GRADUATES

Since 1991, the Dean's Honored Graduates Program has recognized the top honors students in the College of Natural Sciences. Dean's Honored Graduates are chosen not only for their excellent academic record, but also for their outstanding undergraduate research and exceptional contributions to the college and university. Every spring, two are selected as student speakers during spring convocation and all Dean's Honored Graduates are presented with a book award during a special recognition ceremony. The names of all the Dean's Honored Graduates can be found on a plaque on the first floor of W.C. Hogg.

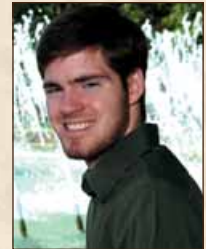
The 2007 Dean's Honored Graduates

TIMOTHY SCOTT BROWN
 BROOKS RILEY CAMPBELL
 JIA WEN JESSICA CHANG
 RICHARD KENNETH DARST
 ROSS EDWARD FALCON
 OLORUNTOYIN O. FALOLA
 MICHAEL RYAN GERRITY
 KEREN ITA HILGENDORF
 KEVIN JAMES HUGHES JR.
 EHREN ANDREW KRET
 ERIC JOSEPH LAI
 HAI-SON PHUOC LE
 GRACE KAO-ANN LIN
 WILLIAM LENEAL MILLER
 LAUREN ASHLEY MUNSELL
 HEATHER MARY SCHERR
 EAMON ROSS WHITE
 HEATHER MICHELLE ZIDOW

2007 Spring Convocation Student Speakers



HEATHER ZIDOW
Biology



KEVIN HUGHES
Mathematics

PHOTOS: SASHA HAAGENSEN



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INSIGHT

STUDENT ENTREPRENEURS

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When Manasi Deshpande, who graduated in May with degrees in math and economics, began lobbying The University of Texas at Austin to improve its online accessibility map for people with disabilities (Deshpande's been in a wheelchair since the age of 13), she didn't imagine that she would end up being the one making the new and improved map for the web. She also didn't imagine that she and a team of fellow students would win a \$50,000 prize to turn her idea for a map into a business.

She did, however, mention the need for a better online map in an article that was written about her during her junior year. Tarun Nimmagadda and Mickey Ristroph, computer sciences students in the College of Natural Sciences with a special interest in robotics, took note.

"Tarun emailed her and told her that we wanted to talk about the idea," says Ristroph. "Because we realized that we had the skills to do it. We started talking to her, and then we went to administrators

about it, getting the maps from them that we would need." The collaboration took on a new urgency last fall when the students discovered the Social Innovation Competition, a contest run every year by the RGK Center for Philanthropy & Community Service at the LBJ School of Public Policy. The contest, which awards \$50,000 to the winners, aims to encourage young social entrepreneurs to pursue their potentially world-changing ideas.

Deshpande, Nimmagadda, Ristroph and two of their student-colleagues—Matt Stolhandske, an accounting and business major, and Shailie Thakkar, a writer—fleshed out what the new map would do and how it could be developed into a full-fledged, socially-minded, for-profit business.

"AccessMap," as they called it, would include pedestrian-

level details, and it would be interactive and flexible, allowing users to communicate with administrators and generate content. The map would have a trip-planning function that would take the specific needs of people with disabilities into account.

"It turns out the problem's actually a robotics problem," says Nimmagadda. "This is something robotocists have dealt with for a very long time. How does a robot get from one place to another place, taking into account its limitations and the features of the landscape?"

When the robot plans its path, that's kind of the same thing as planning a path for a human."

In April, the team submitted its Social Venture Plan to the RGK Center. It described not just how the map would be constructed, but also how their hypothetical company, which they called "AccessAbility," would go about financing, patenting, branding, marketing and pricing its product. They were selected, along with three other teams—two from Rice University and another from The University of Texas at Austin—to advance to the finals. On May 4, after giving their final presentation, they were announced as the winners and awarded the \$50,000 prize as start-up capital.

The hope, says Ristroph, is to finish most of the programming by the end of the summer, at which point they'll begin working with UT to integrate the map into the school's website. The ultimate goal is to integrate the maps into wireless and GPS-enabled devices—so that, for instance, a visually impaired person could have directions piped directly into his bluetooth device—and to build a business around AccessMap and other products like it.

"Our goal," says Deshpande, "is to improve the quality of life for people with disabilities, to make it so that they don't have to put forth extra effort. If they're here for the purposes of the teaching and learning, that should be their concern, not, 'How do I get to the lecture hall that I need to teach or study in?'" ❖

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INSIGHT

UNDERGRADUATE RESEARCH FORUM AWARDS

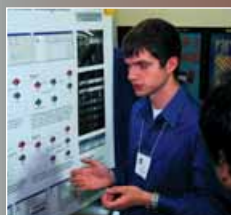
INSIGHT



In April 20, The College of Natural Sciences celebrated its student-scientists at the annual Undergraduate Research Forum, a one-day event during which more than 120 students gave posters and oral presentations describing their research.

The best and most innovative posters and oral presentations were recognized with awards judged and sponsored by the university, faculty, alumni and industry. The award-winners from the 2007 Undergraduate Research Forum are:

SURGe Award for Best Freshman Research Initiative Poster The Roux Stream	Norman Hackerman Award for Excellence in Chemistry Research Nathan Froemming Clarissa Enriquez
SURGe Award for Most Inspiring Poster Natalie Blum and Joseph William	University Co-op Award for Excellence in Biological Sciences Research Trent Hodgson
Schlumberger Award for Excellence in Physics Research Brooks Campbell	PPD Award for Excellence in Biological Sciences Research Jessica Shay
Intel Foundation Award for Excellence in Mathematics Research Rodrigo Trevino	Ambion Award for Excellence in Molecular Biology Research Yuxuan Wang
United Space Alliance Award for Excellence in Astronomy Research Kyle Penner	University Co-op Award for Excellence in Health/Social Sciences Research Lindsay McCracken Ming Lin
IBM Award for Excellence in Computer Sciences/Computer Engineering Research Adam Zacharski	Schlumberger Award for Excellence in Geology Research Ana Collins
Intel Foundation Award for Excellence in Computer Sciences Research Mickey Ristroph	Hewlett-Packard Awards for Best Oral Presentations Keren Hilgendorf Kyle Penner and Sarah Miller Vikram Agarwal
Norman Hackerman Award for Excellence in Biochemistry Research Maria Cabezas	



PHOTOS: DAWN JONES-GARCIA



ERIC

INSIGHT
Q & A
WITH ERIC ANSLYN
INSIGHT

PHOTO: SHAWN STEWART

Eric Anslyn, the Norman Hackerman Professor of Chemistry, has been at The University of Texas at Austin since 1989. He studies the physical and bio-organic chemistry of synthetic and natural receptors and catalysts, and he's been a pioneer in developing techniques and technologies—including the “electronic tongue”—to mimic the human senses of taste and smell.

He's also won numerous teaching awards, and this past year developed and directed a research stream as part of the Freshman Research Initiative (FRI). *Insight* recently sat down with Anslyn to discuss wine, research, teaching, and the point where they all meet.

ANSLYN



INSIGHT: *What drew you to the study of wine in particular?*

ANSLYN: Our group studies ways to mimic the senses of taste and smell, and wine has been a wonderful test bed for us. We've analyzed soda pop before, for instance, but there are compounds in Sprite that are not present in Coca Cola, and vice versa, so they're much easier to differentiate. A cabernet sauvignon, on the other hand, has compounds that are only very subtly different from the compounds in a zinfandel. They're almost structurally identical, so it's much more challenging.

We know it can be done, however, because humans can do it. There are professional tasters who are paid to detect these very subtle changes between one wine and another. What we intend to do in this research stream is to mimic that discrimination by finding compounds that interact with various components of wine and change color upon that interaction.

INSIGHT: *How have you designed the research stream in order to both teach the students and advance your own work?*

ANSLYN: It's an interactive process. This semester, all I'm teaching them is introductory fundamental organic chemistry in order to get them ready to understand proteins and peptides. We've designed experiments that help to reinforce the concepts that I'm giving in the lecture and help to get them ready for the hands-on things they'll do next semester.

Next semester, they'll be making proteins and peptides with automated synthesizers. What we're trying to do is to design the peptides—we call them "receptors"—to bias

their structures for the binding and recognition of the components of wine.

The big goal, which would be pretty remarkable if it were achieved by the stream within a couple of years, is to have a series of these receptors that the students have created that can tell the difference between the components of really similar wines. Such receptors could tell you, based on all of the different color changes that one observes, that this is a pinot noir, this one is a cabernet, this one's a zinfandel, etc.

INSIGHT: *How do you see the students' work making the transition to your research?*

ANSLYN: One of the reasons I absolutely love this concept is that it's expanded my research group by 30 young undergraduates, who, once they're educated, are able to do things that are very analogous to what my own PhD students are doing.

The compounds they've created—the ones that work—will transition into my research group, where everybody's over 21, and where we can actually work with real wine. My dream would be to end up writing multiple papers from this work, and if that happens, the students whose receptors we use are going to be on manuscripts that get published.

INSIGHT: *Where else might this particular research take you, in terms of other applications?*

ANSLYN: The research is ultimately geared toward medical applications. We may eventually be able to do a similar kind of analysis of blood, or urine, or saliva, to determine, for instance, if a patient has a predisposition to cancer or even already has cancer that hasn't yet been diagnosed.

Right now there are biomarkers that physicians look for in your blood to tell if you have cancer, but these biomarkers are expressed at very low concentrations and there's often only a very small change in the protein that's leading to the cancer, or is being produced by the cancerous cells. Because

the proteins are so structurally similar, they're really hard to fish out and find. But we may eventually be able to do a very sophisticated analysis of the presence of such changes, and wine is a good place to start, to see if the methods even work, before we start a program with much greater complications and ramifications. ❖

"We may eventually be able to do a similar kind of analysis...to determine...if a patient has a predisposition to cancer or even already has cancer that hasn't yet been diagnosed."
