2012 Highlights

Summaries of selected research projects presented at Ohio State’s 17th annual Denman Undergraduate Research Forum
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Many undergraduates at Ohio State are involved in research and other creative activities outside their normal course work. Working with faculty, graduate students, peers, or independently, these talented and highly motivated students are an inspiration to the entire university community. Each year, undergraduates in all fields of study are invited to present completed projects or works in progress at the annual Denman Undergraduate Research Forum.

In 2012, 607 students presented 538 projects at the forum. Some projects are quite technical because they are carried out in specialized fields of study. To make them more accessible, we collected the following non-technical summaries from representative students. We invite you to browse these pages to see the excitement, value, and diversity of these scholarly contributions. This is only a brief introduction to the types of research our students are working on—a list of all student projects from this event, along with descriptive abstracts, is available at the Denman Forum website, denman.osu.edu. You also can find undergraduate research theses at Ohio State’s Knowledge Bank, kb.osu.edu.

We thank Richard J. and Martha D. Denman, Dr. Gerard and Mrs. Rossala Boutin, the Honors & Scholars Center, the Office of Research, and the Office of Undergraduate Education; corporate sponsors Eli Lilly & Company, Honda R&D Americas, Inc., Procter & Gamble, Battelle, and Honda-OSU Partnership; and the many students, faculty, and staff who contribute to undergraduate research activities at the university. We are grateful to Ohio State alumna Lindsey Perry, who created the image of the lantern on the back cover; and to the URO’s program assistant Mara Penrose, who worked extensively with the students featured here.

Highlight of Undergraduate Research

Professor Allison A. Snow
Director

Alex Chaitoff
Student Advisory Committee Co-Chair

Breonna Slocum
Student Advisory Committee Co-Chair
Procedural modeling is a technique used in computer graphics to generate 3D models algorithmically using a computer program. My project uses procedural modeling to create computer-generated rocks for 3D environments. These environments ultimately serve as settings for both movies and video games. The process begins with a basic 3D shape, such as a sphere or a cube. In computer graphics, the information of all 3D shapes primarily consists of list vertices and triangles. Vertices are points in 3D space and triangles are visible surfaces that consist of three vertices each. By creating algorithms that perform operations on that information, I can modify the information of each shape. These operations are performed in a random order. The result is that each rock model looks unique. This process can generate incredibly varied rock models without painstaking shaping of each individual rock piece. Ultimately this allows for a more immersive and realistic 3D environment.

Project Title: **Procedural Modeling of Rocks**

Advisor: Roger Crawfis
Research shows that when fathers are more involved in their children’s lives, children do better in school and life. But some fathers are more involved with their children than others. Some believe that mothers are the biggest influence on father-child involvement. In this view, the mother acts as a “gatekeeper” by controlling the father’s involvement with the child. In my study, I wanted to figure out whether mothers’ gate opening (i.e., encouraging) and gate closing (i.e., discouraging) behaviors towards fathers could be observed in videotaped family interactions. I watched 152 of these videos and rated mothers’ gatekeeping behavior. Then I compared these behaviors to questionnaires about gatekeeping that parents had completed. I found that when I observed mothers to gate close more, mothers reported more gate closing. I also looked at which factors influenced gatekeeping. I found that mothers who gate opened more also had high levels of life satisfaction. Mothers who gate closed more had high levels of parenting perfectionism and depression but lower levels of life satisfaction. My research was funded by the College of Education and Human Ecology and the Honors & Scholars Center. Undergraduate Student Government supported my trip to Chicago to present at a psychology conference.

Project Title: Maternal Gatekeeping: Does She See It the Way We Do?
Advisors: Sarah Schoppe-Sullivan and Claire Kamp Dush

What’s next? Lauren will pursue a PhD at The Ohio State University in Human Development and Family Science.
Aesthetics is a value that often goes neglected in the field of chemistry despite the complex, architectural nature of individual chemical structures. The visualization of chemical information is illustrated in different models and molecular conformations such as 2D representations, ball and stick models, and 3D computerized simulations. While aesthetics is interpreted through direct methods by using the senses of the body—for example, viewing a painting by Dali or listening to Beethoven’s Moonlight Sonata—chemical representations are based on theoretical perception of molecular structure. These perceptions are inferred through indirect methods, such as spectroscopy, simply because atoms are too small to be seen by the eye. In this way, a molecular structure is an abstraction of reality. This research explored the aesthetics of organic chemistry through the interpretation of varying depictions of the disaccharide, sucrose (table sugar), through available media including print, photography, model, and computer simulation. We explored individuals’ relative understanding and interpretation of these media and their relationship to aesthetics. By surveying students in organic chemistry and art classes, we examined which molecular depictions were most aesthetically pleasing or did the best at relaying chemical information and how the two interacted. We found that a correlation did not exist between the two, but it was clear that students favored structures showing the simplicity of the molecule while still keeping its chemical context. Inspired by these results, we created a stop-motion short film to convey structural information about sucrose in a miniaturized, molecular world using model train figurines and over 2,000 still photographs. This research offers a new perspective on the relationship between aesthetics and interpretation of chemical structure.

Project Title: The Aesthetics of Chemistry: Studies Towards the Interpretation and Communication of Chemical Structure
Advisor: Christopher Callam

What’s next? Katelyn is applying for dental school and plans to pursue a career in dentistry.
It has been shown that areas of rural Nicaragua possess grossly contaminated water, regardless of source, even in areas with access to running water. Our organization will distribute the Tulip Siphon Filter and BioSand filter to villages in the region in Boaca to provide them access to clean water. However, cultural barriers exist in the implementation and maintenance of these filters. Are we sure that the indigenous people are fully educated on how to properly utilize the filters? Is the model of purification a sustainable one? The Pure Water Access Project, Inc. addresses these questions through cultural research and regular follow-up visits to confirm the sustainability of technologies. Without proper attention paid to the issue of cultural implementation, the population will remain at risk. We will survey the populations during this process to gain an understanding of their knowledge of hygiene and conduct an educational program about water sanitation, also providing training of the households in use and maintenance of their respective filters. Over the course of one year, we will return to the villages and assess the health and hygiene of the populations, their knowledge of sanitation, their use and maintenance of their respective filter, and the integration of the filters. Donations to fund this project can be sent through PayPal at purewateraccessproject.org/donate.html.

Project Title: Differential Analysis of Sociocultural and Health Impacts of the Bio-S and Filter and the Tulip Siphon Filter in Rural Nicaragua
Advisor: Howard Werman

What’s next? Adam will be attending Case Western Reserve University School of Medicine and will continue working with the Pure Water Access Project.
The Internet is creating a shift in the way companies engage their customers. Instead of merely soliciting feedback from customers once a product is made, many companies are co-creating and collaboratively designing products with a community of users. Most prior research investigating customer co-creation has focused on the utilitarian value of developing products at lower costs and risks. Some previous research has shown that consumers who are empowered to select what products a firm offers show a stronger demand for the selected product than non-empowered consumers due to an increase in psychological ownership of the product. My research built on these findings by exploring what effect the amount of participation an individual perceives him/herself as having in a collaborative design process has on his/her degree of psychological ownership. I ran two behavioral experiments involving 414 participants that had them go through a mock collaborative design process designing travel coffee thermoses. I found that any perceived amount of participation, whether large, small, or ambiguous, equally increases consumers’ psychological ownership of a product, compared to attributing full influence to a single “winner,” which is equal to telling consumers they had no influence on the final product.

Project Title: *A Community of Me: The Role of Participation Allocation in Determining the Effectiveness of Consumer Empowerment Strategies*

Advisor: Rebecca Naylor

In my behavioral experiments I used Qualtrics Survey Tool, made custom travel coffee thermos designs, and used survey logic to give participants the feeling that the choices they made when co-creating the travel coffee thermos were actually incorporated into the product’s final design.
Imagine placing a series of pawns on a chessboard. For every pair of pawns you’ve placed, you can imagine a line being drawn between them. If any of these lines goes exactly through the center of another square, you can’t place a pawn on that new square. What is the largest number of pawns you can place? This is equivalent to the No-Three-In-Line Problem, a problem that has gone unsolved for nearly 100 years. For our research, we imagined each line wrapping around the board until it came back to where it started. Using computer algorithms we were able to find all such combinations of points for some smaller cases and were able to eventually prove some upper and lower bounds for certain special cases. For example, we can now say things like: For any prime number $p$, if you take a chessboard with $p$ rows and $p^2$ columns, if you choose your positions wisely, you can put $2p$ pawns on that chessboard (even if you let the lines wrap around). This is particularly important because $2p$ is the absolute maximum size possible as there are two pawns in every row.

Project Title: *The No-Three-In-Line Problem on a Torus*
Advisors: Bart Snapp and James Fowler

What’s next? Andrew will be working as an application developer at JPMorgan Chase.
For my honors thesis project, I worked with dogs at the Richland County Dog Shelter in Mansfield to test how dogs perceive human emotion using multiple cues. For each test, the dogs faced a human demonstrator who showed either a happy or a sad face, and we played audio of the matching emotion, either laughter or crying. Once the dog acclimated to that, we changed the face-voice combination to either the other matching one (e.g. smiling and laughter changed to frowning and crying) or to a mismatched one (e.g. smiling and laughter changed to smiling and crying). We analyzed the dogs’ reactions to see if they responded differently to mismatched combinations than matched ones, and our hypothesis that they would react more significantly to the mismatched combinations was confirmed.

We were able to conclude that dogs recognize emotional incongruence in human emotional displays, showing that they use multiple cues to interpret human emotion. It was really fulfilling to create and finish a project in which I could work with animals and learn a lot about animal behavior and cognition, while also contributing to emerging knowledge in that field. I hope to continue learning about and researching behavior in vet school.

Project Title: Do Domestic Dogs Recognize Emotional Incongruence in Human Faces and Voices? Advisor: Dawn Kitchen

What’s next? Allison will be attending Ohio State’s College of Veterinary Medicine.
Psychologist William James first began exploring the topic of how body posture can interact with thoughts. James claimed that smiling can cause some to feel happy and tears cause someone to feel sad. The body gives direct cues to feel something, according to James. A recent embodiment model found that expansive positions increased feelings of power and contractive positions decreased feelings of power. However, a second, more complicated embodiment model challenged all this by hypothesizing that expansive positions increased feelings of confidence, not power.

To investigate this difference, 128 participants were asked to write either about a task at which they have excelled or failed, and were also asked to stand and sit in either expansive or contractive positions. Their current affect and self-attitudes were measured. The results supported the latter, more complicated model: expansive positions created confidence, which was demonstrated prominently when those thinking negative thoughts from the failure writing task then felt confident (from the expansive positions) in their negative thoughts and had more negative self-attitudes. This is called self-validation.

Project Title: Assume the Position: The Effects of Expansive and Contractive Positioning on Metacognition, Attitudes, and Affect
Advisors: William Cunningham and Pablo Briñol

What’s next? Leah will be starting graduate school at Ohio University and pursuing a doctoral degree in industrial/organizational psychology.
Recently we have seen a dramatic resurgence of bed bugs. These insect pests feed on human blood and often leave itchy, painful bite marks on their hosts. Unfortunately, they are resistant to many pesticides, and getting rid of them is expensive and time-consuming. The goal of my project was to see if ultraviolet light could be used as a new, non-chemical way to kill bed bugs. I exposed bed bug eggs and nymphs to UV light for periods of 10, 5, or 2 seconds and then tracked death rates for the next two weeks. The results showed that this treatment was extremely effective in the case of eggs, with mortality rates ranging from 95 to 100 percent. The effect on nymphs ranged from 3 to 42 percent mortality. These findings are significant since the egg stage is typically the most resilient stage, but under this treatment it is the most vulnerable. I also suspect that exposed bed bugs that survive will be less able to physically find a human host since they are significantly less active. I plan to continue this experiment with other developmental stages and also examine whether exposure is harming their host finding or feeding abilities.

Project Title: *Don’t Let the Bed Bugs Bite: Ultraviolet Light Kills an Arthropod Pest*
Advisor: Glen Needham

Can ultraviolet light be used as a new, non-chemical way to kill bed bugs?
Infant mortality poses a serious concern for populations in many developing countries. India has the 48th highest infant mortality rate with 46 deaths per 1,000 live births. By contrast, the United States ranks 174 out of 222 countries, with an infant mortality rate of six. Infectious diseases, particularly diarrheal disease due to unhygienic feeding practices, are responsible for a large majority of these deaths. My research study sought to examine the relationship between feeding practices and incidence of infant diarrheal disease at Fatima Hospital in Lucknow, India.

I chose this hospital because I was born there and spent my early childhood in this city. I designed a structured questionnaire and interviewed parents of 93 children aged 0 to 5 years in both English and Hindi, regarding feeding practices that included three categories: exclusive breast-feeding, exclusive top feeding, or combination feeding. I found a lower incidence of diarrhea in infants that were exclusively breast-fed in their first year of life. More precisely, 63 percent of the exclusively breast-fed children had no episodes of diarrhea, as compared to 46 percent of children who received combination feeding and 25 percent of children who received exclusive top feeding. These findings are consistent with data from the WHO, which has strongly promoted breast-feeding in countries worldwide.

Project Title: *Childhood Feeding Practices in Northern India*
Advisor: Uma Gupta
Co-Author: Amrit Kamboj
Pancreatic cancer is the fourth-leading cause of cancer deaths in the United States. This statistic is not because of a high diagnosis rate but because of an extremely low survival rate, which is less than four percent for five years after diagnosis. The goal of my project is to create a targeted drug delivery system to increase the amount of drug that can be delivered while decreasing the toxicity for the patient. Cancer cells are naturally porous due to their high demand for nutrients, and therefore nanotubes may enter those specific cells while remaining outside healthy cells. The advantage that this feature brings is that the drug, encapsulated in the nanotube, can be targeted to the cancer cells when injected into the blood stream. So far, one compound has been successfully created for this goal and it forms self-assembling nanotubes in water. However, it does not show these formations in a mock of human blood conditions. The future goal is to create a derivative of the first compound, modifying the electrostatic character, to form nanotubes in mock blood conditions and then to test its viability in mouse models.

Project Title: **Self-assembled Nanotubes for Targeted Drug Delivery for Cancer Treatment**

Advisor: Jon Parquette

"Ice nanotube inside the carbon nanotube," courtesy of Masakazu Matsumoto (Creative Commons license CC BY 2.0)
Dancing Upside-Down, Inside-Out, and Everywhere in Between

I am both a climber and a dancer, thus I questioned the connection between the athleticism of climbing and the artistry of dance. I traveled to California to study with world-renowned aerial dance company Project Bandaloop to learn specific aerial harness techniques. I collaborated with my cast of both climbers and dancers to create an interdisciplinary performance. My performance included dancers standing perpendicular to the climbing wall suspended by ropes, running and spinning 20 feet in the air, and using the climbing holds in choreography. The audience was awestruck, slightly dizzy, but smiling at the end of each performance. If only they knew what the cast felt like after climbing up walls, being suspended from ropes, and being upside down for 30 minutes.

By combining two movement aesthetics—climbing and dance—my project presented dance in a new medium, challenged the performers’ and audience’s perception of space, and brought art out into the community to entertain, educate, and inspire.

Project Title: Dancing in the Vertical Plane
Advisors: David Covey and Susan Hadley

What’s next? Kristin will be teaching dance in Columbus Public Schools, and she plans on producing another vertical dance performance at the Scioto Audubon.
My research focused on the terracotta figurines from a Bronze Age site in northeastern Iran called Tureng Tepe. This site is critically important because not only was it the very first site excavated by American scholars in Iran, but also because it is the largest site in the region. The figurines from Tureng Tepe are unique in the Ancient Near East, and therefore quite significant. Previous scholars who have engaged with this material have generally agreed that these figurines are evidence of various kinds of goddess worship at Tureng Tepe. In my research, I questioned these assumptions on theoretical and empirical grounds. In order to "test" this hypothesis, I documented these figurines using a variety of analytical methods, focusing specifically on form, decoration, and context. What I found is that there is little evidence to suggest the existence of worship of a Mother Goddess at Tureng Tepe. The corollary of performing this analysis was a reformulation of the fundamental questions at the heart of figurine studies from "what" questions to "how" questions. This shift allows for not only an anthropological analysis of the significance of these figurines, but also more systematic cross-cultural analysis. I propose that by investigating the semeiotic ideologies that were materialized through figurines, we can begin to build a picture of the material process of identity negotiation in the Ancient Near East at both a local and regional scale during the Bronze Age.

Project Title: **Ceramic Bodies and Social Life: Deconstructing the Goddess Narrative at Tureng Tepe**
Advisor: Joy McCorriston

What’s next? Kyle will be spending 10 weeks intensively studying Russian near Moscow on a Critical Language Scholarship from the State Department. Next, he will take a gap year to publish his thesis and a proper site report for the Wulsin excavations at Tureng Tepe, as well as to apply for graduate school.
In 1820, five streets converged at a bustling intersection in New York City, known as Paradise Square for the park at its center. The park’s name quickly grew ironic as it became the center of the Five Points neighborhood, the most notorious slum in American history. This project focuses on the different aspects of the 1800s that contributed to heightened violence within the Sixth Ward, the Five Points’ government sector. Three violent categories studied were gang warfare, homicide, and infanticide with a single societal characteristic linked to each. Infanticide was linked to the high amount of poverty present in the neighborhood, alcohol was present in the majority of homicides recorded, and the political conflict between the Nativists and the Irish immigrants was a major contributor to the emergence of criminal gangs, the first street gangs in America. My research is based on work performed at the New York Public Library, the Historical Society, The Ohio State University Libraries, and my original contribution of New York coroners’ inquests between 1833-1835 and 1847-1849. This study highlights the effect of immigration, prejudice, and poverty on crime within a society, an issue that is not of little importance in the modern era.

Project Title: The Bloody Ould Sixth Ward: Crime and Society in Five Points, New York
Advisor: Randolph Roth
The hijab (head covering) worn by Muslim women has been defined as a sign of liberation or a constraint; obligation to God or submissiveness to men; equality or oppression; and freedom or objectification and degradation by the exploitation of men. The interpretation of the hijab has generated confusion as well as ignorance within the Western mainstream society, media, and school curriculum. Previous research suggested that negative experiences of minority groups may or may not be factors that relate to self-concept. Thus far, no research exists on how negative experiences in school can be related to a Muslim girl’s self-concept. This research seeks to extend the limited existing research that examines young Muslim girls’ experiences in central Ohio schools as it relates to the wearing of clothing that identifies them as Muslim. The researcher interviewed participants as part of a focus group to share their perspectives on the hijab and their school experiences. A questionnaire was developed that measured religious affiliation and included demographic information. And finally, participants were asked to complete the Harter’s (1988) Adolescent Self-Perception Profile Assessment (SPPA) to measure self-concept.

Results showed that participants on average received a positive self-concept within the seven domains except the Athletic Competence (average mean of 2.29 out of 4). In addition, due to the small sample size of diverse ethnicities and those reported not wearing the hijab, there were no relevant relationships that presented significant results. Furthermore, this study indicated four common themes (hijab as a choice, intention, experiences in school, and the pressure to be beautiful) that were expressed in the focus groups to illustrate personal stories including exclusion in sports in school due to wearing the hijab. This study provides personal experiences of Muslim girls who wear or do not wear the hijab in schools and implications for future research on the self-concept within this population.

Project Title: **Self-Concept in Muslim Adolescent Girls: Hijab and the School Experience**
Advisor: Antoinette Miranda

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*What’s next? Eman will be taking a year off to apply for a research position. She will then be applying to graduate school, with a focus on school psychology.*

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*People always judge me initially because I’m covered. I’m immediately considered as a terrorist, oppressed, dumb, really degrading terms and it all fades away once they get to know me so it doesn’t bother me as much. I blame the media for twisting the face of Islam into this random acts of terror encouraging religion: We can’t erase what’s been pre-programmed by the media, but we can sure change it, and that’s what I do.*

--focus group participant
Apoptosis, or programmed cell death, is a mechanism essential to development, cell number maintenance, and removal of damaged cells. A protein called Hsp27 inhibits the activity of caspase-3, thereby preventing apoptosis. My project was to determine the region of Hsp27 that interacts with caspase-3. To do this, I created a series of deletions within Hsp27, and then expressed them in human cells. I then used immunoprecipitations to see which Hsp27 deletions couldn’t bind to caspase-3. Basically, using antibodies, I isolated caspase-3 from the cells, and then used additional antibodies to see what proteins are bound to it. If an Hsp27 deletion wasn't bound, that meant I had deleted an important piece in the interaction. We determined that amino acids 104-120 are the most essential of Hsp27 for binding to caspase-3. This research will impact on the treatment of cancer, a condition where cells essentially refuse to die. Doxorubicin (dox) is a common chemotherapy drug that, when used at an effective dose, will kill not only the cancer but also heart cells. Eventually, we hope to create a heart-targeted nanoparticle with the anti-apoptotic Hsp27 piece that could be given simultaneously with chemotherapy to kill the cancer, but save the heart.

Project Title: Molecular Fingerprinting of Hsp27 Anti-Apoptotic Activity
Advisor: Andrea Doseff

What’s next? After graduation, Justin plans to attend pharmacy school.
Defending the Majoritarian Case Against Judicial Review

Although the Founding Fathers of the United States strongly favored a democratic government, important checks were placed in the Constitution to restrict popular rule. One of these constraints, judicial review, removes from popularly elected representatives the final authority to decide important political issues, and places it into the hands of a small group of largely unaccountable judges. The question arises of whether or not American-style judicial review, a counter-majoritarian institution, is truly compatible with democracy. Jeremy Waldron, in *Law and Disagreement*, argues that the only legitimate form of government is a majoritarian democracy, and that American-style judicial review is thus incompatible with legitimate government. The objective of my research is to analyze Waldron’s view, and to determine whether it is defensible. Waldron addresses the basic problem of political legitimacy: that political legitimacy depends on the agreement of all reasonable citizens, but there is abiding reasonable disagreement about all substantive theories of rights. I present Waldron’s procedural solution to the problem of legitimacy, according to which only a fair procedure—encapsulated in majoritarian rule—can be free of reasonable disagreement. I then consider objections from Ronald Dworkin, who endorses a substantive solution according to which some considerations of substantive fairness—encapsulated in non-majoritarian rule—are beyond reasonable disagreement. I argue that Dworkin’s solution lacks any independent criteria by which to judge better or worse outcomes, and for that reason it is not justifiable to all reasonable citizens. I also consider the objection that Waldron’s proposal is not purely procedural, but itself contains controversial substance. I concede that it is thinly substantive, but deny that it is controversial. Finally, I argue that if Waldron’s majoritarianism can be maintained against these objections, the desirability of American-style judicial review should be reconsidered in light of its incompatibility with democracy.

Project Title: *Majoritarianism: A Defense Against American-Style Judicial Review*
Advisor: Piers Norris Turner

What’s next? Matthew interned at the San Francisco office of Covington & Burling LLP law firm during summer 2012, then started Stanford Law School in autumn 2012.
My research focuses on the gene Programmed Cell Death 4 (PDCD4) in uveal melanoma (UM), the most common primary ocular malignancy in adults. PDCD4 is a tumor suppressor gene named a “master regulator” due to its complex control of molecular pathways. Loss of tumor suppressor function of PDCD4 has been described in several cancers, but its role in UM is not clear. In my lab, I studied 28 UM tumors, 2 choroids, and 5 UM cell lines. I assessed these samples for RNA expression of PDCD4 and miR-21 (a potential regulator of PDCD4) using quantitative real-time PCR, and for protein expression of PDCD4 with Western blots. I found that 39 percent (11/28) of UM tumors had decreased PDCD4 expression, and 74 percent (14/19) had decreased miR-21 expression. Two cell lines, C918 and OCM-3, which exhibited low baseline PDCD4 protein levels in preliminary Western blot, were treated with fluvastatin sodium, a PDCD4 activator. This increased expression of PDCD4 protein and RNA in the cells, and selectively inhibited cell proliferation in UM with decreased PDCD4 expression. This study is the first regarding the potential role of PDCD4 in UM, and suggests that selective PDCD4 activation may be a potential therapy for UM treatment.

Project Title: The Role of Programmed Cell Death 4 in the Pathogenesis of Uveal Melanoma
Advisor: Mohamed Abdel-Rahman

What’s next? Tiffany will pursue an MD/MPH at The Ohio State University College of Medicine.

The Molecular Pathology of Ocular Melanoma

Tiffany Wang, ’13
(Psychology and Zoology)
Asynchronous Stimulation: 
Mimicking Nature to Improve Cochlear Implant Sound Perception

Cochlear implants (CI) restore some sensation of hearing to the profoundly deaf by stimulating the auditory nerve through implanted electrodes. The current sound-processing standard, Continuous Interleaved Sampling, stimulates all electrode channels with current pulses at a constant rate. Success in CI users is limited to speech recognition. Finer temporal patterns such as speech intonation are lost when neurons are stimulated synchronously. A proposed alternative, Asynchronous stimulation, allows each channel’s stimulation rate to adapt to the input stimulus, potentially conveying both sound frequency and phase to the CI user. This research experimentally evaluated the ability of Asynchronous stimulation to present fine timing information in CI users for the first time.

Project Title: Asynchronous Stimulation for Cochlear Implants
Advisors: Bomjun Kwon and Steven Bibyk

What’s next? Tom will be pursuing a PhD in Electrical Engineering at UC Berkeley as an NSF Fellow.
SAVE THE DATE

The 2013 Denman Undergraduate Research Forum will be held on Thursday, March 28, 2013.