Newsletter

College of Physical and Mathematical Sciences

April 2008

Olympic Gymnast Speaks to Graduating Seniors

1984 Olympic gold medal gymnast, Peter Vidmar, spoke at the recent college graduating senior's banquet. Speaking to some 200 seniors and spouses, Vidmar kept the audience spellbound while recounting his preparation for Olympic competition and his eventual gold medal performance. He spoke of keeping promises, setting high goals, managing risk, and learning from mistakes.

Vidmar recounted promises he made to himself and his coach that prepared him to deal with failure and disappointments, and to ultimately perform at a level where he would lead his teammates to America's first team gold medal since 1904, with their stunning upset victory over the defending world champions, the People's Republic of China. He went on to win the silver medal in the individual all-around competition (the first American men's gymnast to have won an Olympic All-Around medal), and with a perfect score of 10, he captured the gold medal on the pommel horse.

Vidmar challenged the graduates to prepare themselves to be the best in their chosen fields, then to perform at their very best in every occasion. His message, delivered with humor, high energy and drama, drove home the message that each person can push their individual envelope to be better, which ultimately will make the world better.

At the time of his presentation, Peter Vidmar was serving as a Bishop of the Church of Jesus Christ of Latter-day Saints in his California ward. Peter and his wife Donna, a former UCLA gymnast, have five children.

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Important Dates & Events in the College

April 2008

Staff/Admin College Spring Retreat
May 16, 2008
Aspen Grove

Computer Science Demo Day Competition

The third Semi-Annual Demo Day gave 16 students in six separate groups the opportunity to present mentored research that they have been working throughout the semester. Cash prizes for the event were sponsored by Microsoft. This year's $600 grand prize went to Dr. Parris Egbert's "Inhabitant" group. Group members Derek Bunn, David Hansen, and Chris Wilson named their team after the 3D video game they created this semester. To create the game, which features "2D gameplay in a 3D world," the three students researched and experimented with artificial intelligence, physics, real-time programming, and detailed computer animated graphics. Kris Lion, a BYU alum ('07) employed at Microsoft, presented the winners with a giant check. The students' names will also be added to a plaque which will hang in the first-floor foyer of the Talmage Building to commemorate their accomplishment.

The second prize of $350 went to Professor Paul Roper's "Embedded Revolution" team. During the semester, Adam Findley and Von Fugal worked with Professor Roper to create highly interactive, educational, and exciting projects that could be used to update the labs in CS 124, an entry-level computer science course. Third place, a $250 prize, went to a team made up of a single student. Adam Teichert worked with Dr. Eric Ringger on a "Voiced Speech Clustering" project, aimed at partitioning data points of a sound file in a way that reveals hidden info--such as who's speaking, the speaker's emotions, and the languages and dialects used. Teichert envisions many applications for his research, including voice recognition and language detection for 911 calls.

Honorable mentions were given to Graham Henry, Nate Purser and Matt Tolton for their "Asteroids 2.0" project with Dr. Eric Mercer; Trevor Brown, Michael Clark, Matthew Condie, and Stephen West for their "Disaster Exploration by Means of Self-Referential Navigation" project with Professor Paul Roper; and Kendell Clement, Jay Lui, and Ryan Segeberg for their "Tree SAAP" project with Dr. Quinn Snell. Each honorable mention received a $100 award.

Following the demos, audience members, students and faculty alike, were able to pitch their proposals for next semester's Demo Day, giving others the chance to sign up. Everyone was then treated to lunch, courtesy of Microsoft.

Department of Statistics Hosts Summer Institute of Applied Statistics

The 33rd Annual Summer Institute of Applied Statistics will be held June 18-20, 2008 and will be presented by Dr. Scott M. Berry of Berry Consultants. The title of his seminar is "Bayesian Clinical Trials." The course will describe recent Bayesian innovations in the design and analysis of clinical trials.

Additional details and registration information can be found at

http://statistics.byu.edu/summer_institute/

Mitchell Harris Family History

Each year, the Computer Science Department hosts the Family History Technology Conference, a venue designed to bring computer scientists and genealogists together to discuss emergent technology aimed at aiding family history. This year's conference brought together experts in each field from around the world—participants arrived in Provo from as far away as Sweden and the United Kingdom. The keynote address was given by Josh Coates, CEO and founder of Mozy, an online backup company. Josh introduced the concept of a "digital footprint," discussed the history of data storage, and spoke of its future, encouraging everyone to take the necessary measures to protect their data. Following Mr. Coates' address, the conference was divided into three sessions, each with a topic pertinent to family history and technology, interspersed with demos and panel presentations. Topics ranged from interactive fan-charts to data extraction and record linkage.

One of the most compelling presentations was given by Mitchell Harris, a sophomore in computer science at BYU. Mitchell and his advisor, Dr. Dan Olsen, introduced an innovative and efficient way to conduct family history research in their paper, "Contextual Note-Taking for Family History."

As Mitchell asserts, despite the many hours we spend conducting family history research, our efforts are only as good as the data we collect. Traditional family history research involves scrolling through countless rolls of microfilm in family history libraries, taking copious notes with paper and pen on data which seems relevant, and then returning home to sort it all out and attempt to fit it in with data from past searches.

Unfortunately, this traditional paper and pen method holds a number of limitations. Not only are attempts to distill the data from microfilm tedious and time-intensive, but the resulting, handwritten notes are hard to organize; they are unsearchable, unscalable, and difficult to edit. Furthermore, taking notes by hand is an error-prone process and results in a loss of context—obviously we lose any information that we decide not to copy, but we also lose more intangible data—the style of the record maker's penmanship, other interpretations from difficult handwriting, and the look of the record itself.

Mitchell, however, has hit upon a straightforward solution using a camera and a computer. The researcher uses a simple clamp to attach an inexpensive digital camera to the microfilm reader in conjunction with an application developed my Mitchell which will aid in organization and annotation of the gathered data.

With Mitchell's ingenious solution, note-taking is as easy as clicking a button. The camera takes a picture and it is downloaded immediately to the computer, appearing on screen. Transcription errors are thus eliminated, and the researcher can then analyze the information to decide what is useful, annotate the images with Mitchell's application, and organize the information. When viewing the gathered data, users see both the original document and their notes side-by-side on the screen. Another feature of the program allows researchers to isolate the most pertinent information with a red-bounding box. Thus, the most important data is emphasized, but the surrounding information is still accessible as necessary.

Extending the application is simple. Searchability is easily added to the program, the information can be quickly exported to GEDCOM, and it can be integrated with other family history applications. Mitchell's ingenious approach to information extraction turns family historians into true researchers, rather than scribes, making the process of family history research faster, more efficient, and more accessible for a wide variety of people.

College Publications

Chemistry & Biochemistry

Pichavant, M.; Goya, S.; Meyer, E. H.; Johnston, R. A.; Kim, H. Y.; Matagkasombut, P.; Zhu, M.; Iwakura, Y.; Savage, P. B.; DeKruyff, R. H.; Shore, S. A.; Umetsu, D. T. Ozone exposure in a mouse model induces airway hyperreactivity that requires the presence of national killer T cells and IL-17. *J. Exp. Med.* **2008**, 205, 385-393.

Fuangswasdi, S.; Kaveevivitchai, N.; Tuntulani, T.; Savage, P. B. Complexing properties of phenolic diazacrown ethers with transition and heavy metal ions. *J Solution Chem.* **2008**, 37, 45-58.

Savage, P. B.; Nielsen, J.; Lai, X.-Z.; Feng, Y.; Li, Y.; Nelson, G.; Linford, M. R.; Genberg, C. Antibacterial activities of thin films containing ceragenins. In Camesano, T. A. And Mello, C. (Eds.). Microbial Surfaces; Structure, Interactions and Reactivity. ACS Symposium Series 984, Washington D.C.; American Chemical Society, **2008**, 65 -78.

Chin, J. N.; Jones, R. N.; Sader, H. S.; Savage, P. B.; Rybak, M. J. Potential synergy activity of the novel ceragenin, CSA-13 against clinical isolates of *Pseudomonas aeruginosa*, including multi-drug resistant *P. aeruginosa*. *J. Antimicrob. Chemother*. 2008, 61, 365-370.

L. Bari Bhuiyan and Douglas Henderson, "Comment on Contact Conditions for the Charge in the Theory of the Electrical Double Layer [J. Chem. Phys. 123, 234705 (2005)]", Journal of Chemical Physics, 128, **2008,** 117101.

Pei, L.; Jiang, G.; Tyler, B. J., Baxter, L. L., Linford, M. R., "Time-of-Flight Secondary Ion Mass Spectrometry of a Range of Coal Samples: A Chemometrics (PCA, Cluster, and PLS) Analysis", Energy & Fuels, **2008**, 1059-1072.

Jeremy A. Johnson, Kilyoung Kim, Maurine Mayhew, Deborah G. Mitchell, and Eric T. Sevy. "Rotationally Resolved IR-Diode Laser Studies of Ground-State CO2 Excited by Collisions with Vibrationally Excited Pyridine", J. Phys. Chem. A **2008**, 112, 2543-2552.

L.D. Hansen, L.K. Farnsworth, N.K. Itoga, A. Nicholson, H.L. Summers, M.C. Whitsitt E.D. McArthur. "Two subspecies and a hybrid of big sagebrush: Comparison of respiration and growth characteristics", Journal of Arid Environments 72 (**2008**) 643-651.

Computer Science

Geological Sciences

Tingey, B. E., McBride, J. H. (corresponding author), Thompson, T. J., and Stephenson, W. J., South, J. V., and Bushman, M., 2007, Study of a pre-historic landslide using seismic reflection methods integrated with geological data in the Wasatch Mountains, Utah, USA, Engineering Geology, doi:10.1016/j.enggeo.2007.08.006, p. 1-29.

McBride, J. H., Leetaru, H. E., Bauer, R. A., Tingey, B. E., and Ashley, S. E., 2007, Deep faulting and structural reactivation beneath the southern Illinois basin, Precambrian Research, 157, 289–313, doi:10.1016/j.precamres.2007.02.020.

McBride, J. H., Pugin, A. J. M., and Hatcher, R. D., Jr., 2007, Scale invariance of décollement thrusting, in Four–D Framework of Continental Crust, Geological Society of America Memoir 200, edited by Hatcher, Jr., R. D., Carlson, M. P., McBride, J. H., and Martínez Catalán, J. M., p. 109-126.

Hatcher, Jr., R. D., Carlson, M. P., McBride, J. H., and Martínez Catalán, J. M., editors, 2007, Four–D Framework of Continental Crust, Geological Society of America Memoir 200, 632 pp.

Dorais, M.J., Workman, J., and Aggarwal, J., (2008) The petrogenesis of the Highlandcroft and Oliverian plutonic suites, New Hampshire: Implications for the structure of the Taconic orogen. American Journal of Science, 308, 73-99.

Mathematics

Humphries, Stephen P., 2007, *Intersection-number operators and Chebyshev polynomials IV: Non-Planar cases*, Geom. Dedicata, 130, 25-41

Li, Chengzhi & Lu, Kening, 2008, *The Period Function of Hyperelliptic Hamiltonians of Degree 5 with Real Critical Points*, Nonlinearity, 21, 465 -483

Futer, David., Kalfagianni, Efstratia., Percell, Jessica, 2008, *Dehn Filling, Volume, and the Jones Polynomial*, Journal of Differential Geometry, 78, No. 3., 429-464

R.A. Brualdi, & Barrett, Wayne , and 16 others (the result of an AIM Workshop), 2008, *Zero Forcing sets and the Minimum Rank of Graphs,* Linear Algebra and Its Applications, 428, 1628-1648

Campo, M., Fernandez, J.R., & Kuttler, K.L., 2008, *An Elastic-Viscoplastic Quasistatic Contact Problem: Existence and Uniqueness of a Weak Solution,* Archive for Rational Mechanics and Analysis, http://dx.doi.org/10.1007/s00205-008-0116-6

Acosta, Sebastian (BYU undergraduate students), and Villamizar, Vianey, 2008, *Grid Generation with Grid Line Control for Regions with Multiple Complexly Shaped Holes,* MASCOT06 Proceedings, IMACS Series in Computational and Applied Mathematics, 11, 1-12

Wright, David G., & Andrist, Kathryn, 2007, *The Whitehead Manifold Has No Orientation Reversing Homeomorphism,* Topology Proceedings, 31, No. 1., 1-5

Mathematics Education

Physics and Astronomy

Matthew Anderson, Eric W. Hirschmann, Luis Lehner, Steven L. Liebling, Patrick M. Motl, David Neilsen, Carlos Palenzuela, Joel E. Tohline, "Simulating Binary Neutron Stars: Dynamics and Gravitational Waves," Phys. Rev. D77:024006 (2008).

Statistics