Engineering & Physical Sciences

A Genius Among Us: Math Professor Tom Zhang Named 2014 MacArthur Fellow

On September 16, 2014, the MacArthur Foundation awarded UNH math professor Yitang “Tom” Zhang with a prestigious MacArthur “genius grant” for his bounded gap proof of Euclid’s twin prime conjecture. Colleagues have described Zhang’s work as “astounding,” and it has served as an academic foundation for other mathematicians to build upon. Zhang is UNH’s third MacArthur Fellow, joining poet Charles Simic and historian Laurel Thatcher Ulrich who received their awards in 1984 and 1992, respectively.

http://www.unh.edu/unhtoday/unhtoday/veterans/2014/09/genius-among-us
http://www.unh.edu/news/releases/2014/09/bp17zhang.cfm

“Bots” Build Teamwork

Two interdisciplinary student teams, the UNH Remotely Operated Vehicle team (UNH-ROV) and the Extra-Terrestrial Navigation with Particle Swarm Optimization team (ET SwarmCats), are building complex robots (“bots”). The UNH-ROV team, headed by co-captains Tyler Fausnacht ’14 and Nick Geist ’14, is constructing an underwater bot capable of maneuvering a submerged shipwreck that will serve as an experimental platform for graduate-level research. They plan to enter their robot, the ROV, in the International Marine Advanced Technology Education (MATE) ROV Competition in June 2014. Led by team captain Stephen Swanick ’14, the ET SwarmCats are focused on outer space, developing a bot that could help create the technology needed to explore other planets or asteroids in search of precious natural resources. Their goal is to employ a group of ET SwarmCats working independently, using their sensors to communicate with one another to make decisions and reach a common goal. If successful, the ET SwarmCats’ application of particle swarm optimization technology might be of interest to the National Aeronautics and Space Administration for further development.

http://www.unh.edu/unhtoday/veterans/Robots-URC-Parents-Association

CAREER Builder: Three UNH Faculty Members Receive Prestigious Awards

Three UNH faculty members received prestigious CAREER awards from the National Science Foundation (NSF). Margaret Boettcher, assistant professor of geophysics, will continue her study of earthquake processes and prediction by monitoring frequently active oceanic transform faults. Gonghu Li, assistant professor of chemistry, plans to further his efforts toward recycling carbon dioxide into fuel. Tom Weber, assistant professor of mechanical engineering, will expand his research using underwater acoustics to measure methane bubbles in bodies of water. The NSF CAREER award is given to recognize and support junior faculty members who exemplify the role of teacher-scholar through outstanding research, excellent education, and the integration of education and research within the context of the mission of their universities.


L to r: Margaret Boettcher, Gonghu Li, and Tom Weber
Credit: UNH College of Engineering and Physical Sciences
FIRST Class: UNH Hosts Teens and Their Robots at Regional Competition

On March 6-7, 2014, UNH hosted a regional FIRST (For Inspiration and Recognition of Science and Technology) Robotics Competition, a contest testing the robots that teams of high school students have built in six weeks from a common set of parts to accomplish the contest’s challenge. Founded by Dean Kamen, president of Manchester’s DEKA Research & Development, FIRST focuses on applying engineering principles, collaboration, and gracious professionalism – a way of doing things that encourages high-quality work, emphasizes the value of others, and respects individuals and the community. The result: both fierce competition and mutual gain. The event was coordinated and judged by UNH faculty, graduate students, and undergrads, several of whom were former competition participants. The teams and mentors also toured UNH’s engineering facilities and engaged in “meet-and-greet” sessions with UNH researchers and students.

http://www.unh.edu/campusjournal/2014/03/first-class-unh-hosts-teens-and-their-robots-regional-competition
http://www.unh.edu/unhtoday/unhtoday/2014/06/mind-games

‘Frozen’ Science: Magic Meets Reality in Student Snow Hydrology Paper

Three senior engineering majors took a unique perspective on “Frozen,” pitting magic against reality for their final Snow Hydrology course paper. The students – Abby Davis ’14, Jessica Constant ’14, and Scottish exchange student Liam O’Brien – probed the science in the Disney film’s snow mountain, looking at its depth, properties, and melting power. Their findings show that while the film’s science was not entirely wrong, several details were exaggerated for cinematic effect.

http://www.unh.edu/unhtoday/2014/05/%E2%80%99frozen%E2%80%99-science

Hackers Beware – Cyber Defense Competition Brings Region’s Brightest to UNH

In March 2014, UNH’s computer science department hosted the seventh annual Northeast Collegiate Cyber Defense Competition, a contest challenging student teams from several universities to compete in a series of activities designed to test cyber defense skills in the context of real-world, contemporary challenges. The event also featured a keynote address from Brigadier General Ronald M. Bouchard ’77, senior vice president of NCI Information Systems, a company that works closely with U.S. government agencies on cyber security. Said Greg Hilston ’15, president of UNH Cyber Security Club Wildhats, hosting the competition is an opportunity to demonstrate that UNH is “serious and invested in excelling in the area of cyber security.”

http://www.unh.edu/unhtoday/hackers-beware
http://www.unh.edu/news/releases/2014/03/bp04cyberdefense.cfm
http://www.unh.edu/campusjournal/2014/03/unh-hosts-cyber-defense-competition-march-14-%E2%80%93-16

It’s Alive! UNH Engineers Transform Memorial Bridge into "Living" Bridge

The Living Bridge Project, a collaborative effort led by UNH with funding from the National Science Foundation’s Partnerships for Innovation program and the New Hampshire Department of Transportation, will install sensors on the Memorial Bridge over the Piscataqua River in Portsmouth, NH. The sensors will provide infrastructure engineers and community members with a wide range of data, from the status of the bridge’s health, to traffic, weather, sea level, and tidal information. While the project will take up to three years to complete, community members can get a glimpse of the project on “Bridge Sundays” this fall when UNH researchers will be at the bridge to introduce the project and attach temporary structural sensors to capture bridge behavior.

http://www.unh.edu/unhtoday/2014/10/it%E2%80%99s-alive
http://www.unh.edu/news/releases/2014/10/bp06bridge.cfm
Jolly Good Fellows – Four UNH Students Receive Prestigious NSF Fellowships

Four UNH students have been awarded highly-competitive National Science Foundation Graduate Research Fellowships which support outstanding graduate students in science, technology, engineering and math. The winners are: Nicole Jaskiewicz, a Ph.D. student in molecular, cellular, and biomedical sciences; Andrea Jilling, a first-year graduate student in natural resources and the environment; Sonja Pape ’14, a civil engineering major; and Dan Savage ’14, a mechanical engineering major. Jaskiewicz and Jilling will use their fellowships to continue their graduate studies at UNH; Pape and Savage will begin their graduate studies in Fall 2014.

http://www.unh.edu/unhtoday/2014/05/jolly-good-fellows

Julie Bryce, Associate Professor of Geochemistry – Italy

Julie Bryce met with colleagues at the University of Ferrara in advance of a meeting of geochemists in nearby Florence during a trip to Italy last year. The UNH geochemistry research group has a strong relationship with the University of Ferrara that allows for easy access to Italy’s several volcanic provinces that provide a good research setting for geochemists as well as a steady exchange of knowledge and students. The journey provided Bryce with the opportunity to study xenoliths, rocks swept up from under the Earth’s crust as magma rises to the surface, as well as to sample the local cuisine and cappuccino.

http://unh.edu/cie/julie-bryce-2013

Mastering Gravity: Gymnast Wins Research Prize for Testing Strength of Underground Structures

Civil engineering major Adrienne Hill ’15 presented her research at the UNH Undergraduate Research Conference in April, garnering her a First-Place Poster award in the Civil-Infrastructure category at the Interdisciplinary Science and Engineering Symposium. Her project, “Experimental and Theoretical Evaluation of Internal Loads in Underground Retaining Structures,” contributed to the research and testing needed to assure the safety of underground garages and underwater highway tunnels.

http://www.unh.edu/unhtoday/veterans/mastering-gravity

Professor Tapped to Investigate Washington State Landslide

Jean Benoît, professor of civil engineering, has been selected to be part of a national team that will research the devastating Oso landslide that occurred on March 22, 2014 in Snohomish County, Washington. Benoît, who has developed technology such as “smart rocks” – aluminum capsules filled with instrumentation that can be used to record data during experimental landslides – will study the geotechnical effects and the debris flow of the Oso landslide. “We need to better understand the mechanisms associated with debris flows. They are potentially so devastating and often unexpected,” Benoît explained.

http://www.unh.edu/news/releases/2014/04/bp09landslide.cfm
http://www.unh.edu/campusjournal/2014/04/professor-tapped-investigate-washington-state-landslide

Credit: UNH College of Engineering and Physical Sciences
STEM Discovery Lab Looks to Program Expansion

The STEM (Science, Technology, Engineering, and Mathematics) Discovery Lab at UNH Manchester is planning to expand its curriculum for K-12 students. With start-up assistance from UNH Durham, UNH Cooperative Extension, and the Granite United Way, the STEM Discovery Lab has completed a successful pilot year featuring hands-on, dynamic programs for students in a wide variety of STEM disciplines. Expansion plans include the hiring of a full-time STEM Discovery Lab Director to lead efforts to start providing courses in all of the STEM disciplines that would help prepare the students to be part of a well-educated local workforce.

http://manchester.unh.edu/blog/unh-stem-discovery-lab/stem-discovery-lab-looks-program-expansion

TURBOCAM Awarded Grant to Predict Feasibility of Replacing Forging and Casting with an Additive Manufactured Alloy

Turbocam Energy Solutions, LLC, a Dover-based affiliate of TURBOCAM International that develops special processes for turbomachinery products, is collaborating with Marko Knezevic, assistant professor of mechanical engineering at UNH, to evaluate the mechanical behavior of the material used by a novel additive manufacturing technology called selective laser sintering. Additive manufacturing could reduce energy use by 50 percent and reduce material costs by up to 90 percent compared with traditional manufacturing. The collaboration is made possible by a Granite State Technology Innovation Grant from the NH Innovation Research Center (NHIRC), a program administered by UNHInnovation.

http://www.unh.edu/news/releases/2014/07/gs01turbocam.cfm

UNH’s Kevin Short Named a National Academy of Inventors Fellow

UNH mathematics professor Kevin Short has been named a fellow of the National Academy of Inventors (NAI). Short’s research has catalyzed innovations in audio and video compression, audio restoration, speech recognition, improved hearing aids, and data encryption and storage. Election to NAI Fellow status is a distinction accorded to academic inventors who have demonstrated a prolific spirit of innovation in creating or facilitating outstanding inventions that have made a tangible impact on quality of life, economic development, and the welfare of society.

http://www.unh.edu/news/releases/2014/12/em16short.cfm