



Mechanical Engineering

Department Newsletter

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A Word from the Chair

Welcome to the second issue of the new UNH Mechanical Engineering Newsletter. We have so many amazing students, alumni, faculty, and student groups, that it has been difficult to decide who to include in these early editions. But we take solace in the fact that there will be more opportunities to highlight these individuals soon enough in future issues so stay tuned! After another academic year, now is a great time to reflect on all that members of our department community have accomplished this year. Several of our graduate students have received fellowships to support their research including a prestigious NSF Graduate Fellowship Award. Our Senior design teams represented our department well at their international competitions, and our faculty members have been recognized for their outstanding teaching and research. See the list below for more details on some of these accomplishments. It is easy for us to include our current students and faculty in such highlights. But please do let us know about alumni accomplishments and news, both personal and professional, to incorporate.

In this issue, you will get to hear about sophomore Sid Nigam, who was highlighted in the Create Your Own UNH Story program (see <http://www.unh.edu/createyourownstory/CYOS14/sidnigam.html>), Alison Yost (BS '10), Ivaylo Nedyalkov, a Ph.D. student, and Prof. Yannis Korkolis, who started in 2009. Enjoy this second issue and let us know your thoughts!

Brad Kinsey

Professor and Chair, Mechanical Engineering Department

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Mechanical Engineering Awards

ME Grad, Milan Ardeljijan was selected to be a summer student fellow at Los Alamos National Lab. Independent of this he will spend a full year at LANL performing exciting research.

ME Senior, Daniel Savage has received a National Science Foundation (NSF) Graduate Fellowship.

The LunaCats team won 4th place in Mining at NASA. They also won Best Use of Social Media Award and Efficient Use of Communications Power Award.

The FSAE team placed 67th out of 120 teams worldwide at the Formula SAE Brooklyn International Speedway in Michigan.

ME Seniors, John Brindley and Jesse Shull won first place poster award at the URC. Project Title: Research and Development of Wingtip Devices.

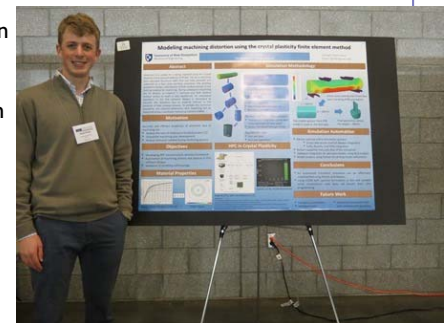
The AERO team placed 2nd for design in the SAE AERO Design International Competition. They also received an honorable mention at the URC.

The Baja team participated in the SAE Competition held in Peoria, Illinois and the results are not yet finalized.

ME Seniors, Andrew Nelligan and Jeffrey Moore attended the Waste-Management Education and Research Consortium (WERC) Competition held by New Mexico State University and won the Intel Innovation Award. They also went on to win 2nd place in the UNH Holloway Competition. This was an interdisciplinary project with students from the Peter T. Paul College of Business and Economics. These students helped the Baja team with their marketing plan.



Remote Underwater Vehicle (ROV)



Daniel Savage at the URC

Newsletter Coordinators:

Barbaros Celikkol

Tracey Harvey

Lauren Foxall



Sid Nigam Class of '16

From Across The Globe

Siddharth Nigam is a sophomore majoring in Mechanical Engineering with a dual major in International Affairs and a minor in Applied Mathematics. He was born and raised in Mumbai, India but spent his junior year of high school in Lancaster, New Hampshire. During that time, he visited and fell in love with UNH! Sid is very active in international and anti-racism programs at UNH. He is the student member of the UNH President's Commission on the Status of People of Color, the co-President of the Indian Subcontinental Students' Association, and is actively involved in five other organizations. In his "free time", Sid is a Resident Assistant at Handler Hall (Serc A) where he is in charge of the In-CEPStion learning community which is a program for first year students in the College of Engineering and Physical Sciences (CEPS). Finally, Sid is very passionate about helping

people, whether it's with his peers on their homework or people in developing nations with sustainability projects. He is one of the Education Chairs for Students Without Borders, and will be traveling to Peru this summer to continue work there.

Despite all of these extracurricular activities, Sid still finds time for his coursework and performs extremely well (3.9 GPA). He also conducted research in the Spring of 2013 on the High Speed Water Tunnel working with Ivaylo Nedyalkov, a Ph.D. student. Sid was recognized by being one of 10 students across the University highlighted in the Create Your Own UNH Story program. We have many amazing students in our program, and Sid is definitely one of them!

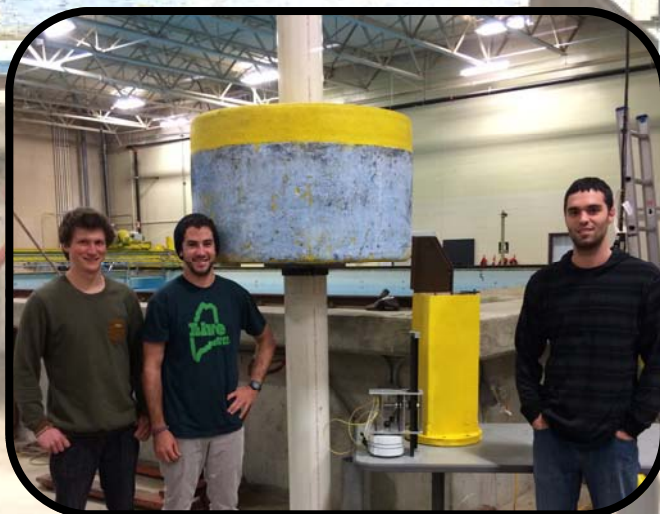
Senior Project: Wave Energy Conversion Buoy

The Wave Energy Conversion Buoy (WECB) is a senior design project in the TECH 797 Ocean Projects course for the 2013/2014 school year. The team consists of three mechanical engineering majors, Corey Sullivan, Carl Smith and Joe Henderson and is advised by Professor Robinson Swift and Professor Kenneth Baldwin. The goal of the WECB team is to design and construct a point absorber wave energy device, which will generate electrical power from ocean waves. A point absorber is a floating structure that has the ability to absorb energy from any direction. The design that the WECB team has chosen consists of two separate buoys that are connected via a metal frame. There is a long cylindrical center buoy, the middle spar, and a wider donut shaped buoy that travels vertically along the outside of the spar, the

follower. This design generates power by using the relative motion between the two buoys to drive a rack and pinion gear system that in turn spins a permanent magnet generator. The intent of the project is to demonstrate that wave energy is a viable source of renewable energy to

provide an additional power source for the battery bank that is used to power the Shoals Marine Laboratory located on Appledore Island, Isles of Shoals, off of the coast of Maine and New Hampshire. The WECB will be tank tested, and implemented for a one week period of time in

April at a site located off the eastern shore of Appledore Island. The team has completed all the components and are in the process of constructing the buoy. The next steps are to begin bench testing the power take off and full model testing in the wave tank before deploying it in the ocean at the Isles of Shoals.



Manufacturing Dreams



Professor Korkolis preparing a uniaxial tension test.
Photo Courtesy Perry Smith

Yannis Korkolis is passionate about manufacturing. “It is one of the main pillars of security and prosperity in the history of most, if not all, developed nations” he says. Fittingly, his research helps develop novel manufacturing processes.

What is it to research in manufacturing?

Here is an example: for decades, car bodies were made out of mild steel. But in the last 15-20 years, regulations on fuel consumption, emissions and also crash worthiness, have caused the creation of many strong, lightweight materials, such as transformation-induced plasticity steels and aluminum and magnesium alloys. The problem is that none of them is as formable as mild steel, so in order to make a car body out of these materials, new manufacturing processes have to be developed. One such process is continuous bending-under-tension, or CBT. “We have built a custom CBT testing machine in Kingsbury, and we have been able to stretch an automotive aluminum alloy that typically fails at about 20-25% strain to

more than 50%. That could be a big step in making car bodies from lightweight materials, as we’ll be able to stretch and form them like mild steel”, says Korkolis.

How about teaching and student involvement?

“I happen to always be building a machine of some kind or the other, so I appreciate everything that we learn from books when it comes to design, but also everything else that we can’t learn from them”, says Korkolis. “When I was teaching Machine Design, I would have the students design a mechanism using dynamics, strength of materials and all of these good things, then print the components in the ME 3D printer, assemble the mechanism and power it up with a motor to see if it worked as planned. At the end of the day, our main mission is to educate engineers, whether it’s in the classroom, in the machine shop, or collaborating on research projects, or ideally, all of these together!” says Korkolis.

Ivaylo Nedyalkov (Ivo) - Rap & Flow



Ivaylo Nedyalkov (Ivo) is in the last year of his Ph.D., supervised by Prof. Martin Wosnik. Ivo is working on developing hydrofoils (2D blade shapes) for tidal current turbines. In order to study foils experimentally, Ivo performed a major over-haul to an old water tunnel acquired from the University of Minnesota by Prof. Wosnik. The tunnel, now named the UNH-High-Speed Cavitation Tunnel (HICAT), is capable of achieving test-section speeds in excess of 30 mph. For his CFD studies, Ivo also developed a numerical “test-bed” for foils (similar to XFOIL, commercial available software) which uses the freeware OpenFOAM and can simulate the flow around and predict the performance of almost any foil shape that one can imagine.

Over the past year, Ivo received a Dissertation Year Fellowship and a Summer Teaching Assistant Fellowship Award from the UNH Graduate School and the 2013 Graduate Student Scholarship Award from the Fluids Engineering Division of the American Society of Mechanical Engineers. Before coming to UNH, Ivo also appeared in a number of TV shows in his native Bulgaria, including the reality show “Beauty and the Geek” (but he won’t say which one he was).

Fluid flows are not the only kind of flows Ivo is interested in. He has been writing and performing rap, mastering his flow for more than 10 years. Now he is excited to see what the future will bring him.

In the Medical Field

Allison Yost, Class of '10



After graduating from UNH with a B.S. in Mechanical Engineering in 2010, Allison has gone on to pursue graduate school at MIT in Cambridge, MA. Growing up with a mother working in healthcare, Allison was always passionate about working on engineering problems in the health and medical space. In addition, while studying at UNH, Dr. Chini's Fluid Mechanics course quickly became Allison's favorite course, and she became inspired to study the subject further. Since then, at MIT, she has tried to work at the intersection of the two. In 2012, Allison earned her Master's of Science in Mechanical Engineering, where her research focused on the design of a fluid filled military helmet liner for the protection against blast-induced traumatic brain injury. Now, Allison is pursuing her PhD at MIT with a research focus area on nanotechnology for biomedicine. Her current research studies the incorporation of carbon nanotubes inside microfluidic chips to enhance detection and capture of rare, nano-sized biomarkers. In addition, Allison is passionate about innovation and entrepreneurship. From 2012-2013, Allison was the Managing Director of the MIT

\$100K Entrepreneurship competition – the largest student run entrepreneurship competition in the world, and currently co-leads an organization called Hacking Medicine – a group that aims to inspire and create an ecosystem of entrepreneurs that launch disruptive healthcare businesses. Allison aspires to teach at the collegiate level, continue research in nanotechnology and biomedicine, and be a serial entrepreneur in healthcare and medicine .

Student Organization Information: Society of Women Engineers:

SWE attended their regional Conference at Western New England University and they will be attending the SWE National Conference in LA in October. Keep an eye out this fall for their annual BBQ which will be open to all women in CEPS of all grade levels. Any CEPS students can join SWE at any time. For more info, contact: swe.unh@gmail.com



Stay Connected to ME!

We would like to stay connected with our alumni and friends and would welcome your newsletter contributions and suggestions.

Please send your news items, e.g. awards, promotions, personal updates, memories of UNH, and suggestions by email to:

lauren.foxall@unh.edu

If you would like to make a financial contribution to the ME Department, please go to:

<https://giving.unh.edu/cepsme>

Check out full length stories and pictures on the Mechanical Engineering website:

<http://www.unh.edu/mechanical-engineering/me-newsletter>