Mechanical Engineering

Department Newsletter

University of New Hampshire, Durham NH

WINTER 2017

FEATURED

SPOTLIGHTS

Nuts and Bolts Fundraising:

Please consider giving a tax deductible donation to the ME General Fund.

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THANK YOU!

A Word From the Chair

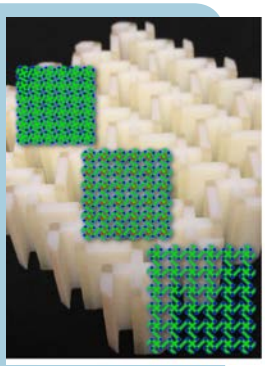
What a start to the spring semester! The first day of classes was cancelled due to inclement weather! For those of you who no longer live in the Northeast, you will remember such days fondly. For those of us here, this is all part of the winter fun!

I had mentioned in a previous newsletter that starting last academic year we have been offering a number of our core courses both semesters. One of the goals was to allow our students to participate in co-op experiences. I am happy to report that this spring and next fall we will run pilot programs of this with BAE Systems, Hitchiner Manufacturing, and Sig Sauer. More details on this effort to come in future newsletters.

As is typical now, the Wildcat Tales section of this newsletter includes alumni updates from almost every decade going back to the 1950's. One of the goals when we started this newsletter was to engage with our alumni more. We all really enjoy hearing about your achievements and what you have been up to (and I know your classmates agree). So please keep sending them in. New this issue is acknowledging the support of our donors. Thank you for your generosity as these gifts are tremendously impactful to our students and program! Happy Winter!

Brad Kinsey
Professor and Chair, Mechanical Engineering Department

Awards & News



-Yunyao Jiang (graduate student, advisor Prof. Li) was awarded an American Society of Mechanical Engineers (ASME)/IMECE travel award and is competing for the best paper award. He also published a paper with Prof. Li, in Advanced Engineering Materials, which was nominated for the front cover of the journal.

Pictured right is an image from Jiang, Y. and Li, Y. (2016), 3D Printed Chiral Cellular Solids with Amplified Auxetic Effects Due to Elevated Internal Rotation.

-Prof. Joe Klewicki received a 90th Anniversary Medal – in commemoration of the FED 90th anniversary at the ASME Fluids Engineering Division Meeting last summer (in DC). These were given to a collection of folks who were deemed to have made significant research contributions in fluid dynamics.

-The NH Business Review wrote an article about the Center for Advanced Materials and Manufacturing Innovation (CAMMI) and industrial engagement at UNH.

-Prof. Li filed two new non-provisional patents on 2D and 3D auxetic chiral cellular solids and one new provisional patent. Prof. Li also won the Young Investigator Travel Award for ICTAM 2016.

-Ben Hasseldine (Post Doctorate, advisor Prof. Li), Chao Gao (graduate student, advisor Prof. Li) and Prof. Li wrote an "Invited-only" paper with their collaborators in Singapore and South Korea to the Journal of Mechanical Behavior of Biomedical Materials.

-Prof. Greg Chini published a "Focus on Fluids" paper in the Journal of Fluid Mechanics, which is by invitation only with colleagues Brad Marston (Brown) and Steve Tobias (Leeds University). Prof. Chini also published an article in Physical Review Letters (PRL).

SENIOR DESIGN PROJECTS

FOR ACADEMIC YEAR 2016-2017:

ME 755- Competition (C) and Industry (I) Projects	ME 755- Research (R) and Industry/Research (I & R) Projects	TECH 797- Ocean Competition (C), Research (R), Industry (I), and Other Projects
Formula SAE Car (C)	Thermal Energy Storage Research (R)	Remotely Operated Vehicle (ROV) (C)
AeroCats (C)	Tension Compression Testing of Sheet Metal (R)	Optimizing Aquaponic Systems to Improve Sustainability (OASIS) (R)
LunaCats(C)	Quantitative Evaluation of the Mechanical Performance of Bio-Inspired Cellular Solids (R)	Autonomous Surface Vehicle (ASV) (R)
ET NavSwarm (C)	Determination of Coupling Coefficients in Magnetic Pulse System (R)	Low Frequency Acoustic Projector (R)
Mini Baja (C)	Drag Reduction for Cyclist in Echelon Formation in Cross Wind (R)	Ocean Acidification (R)
Extreme Chunkin (C)	Bonding Dissimliar Substrates through the use of Mechanical Interlocking Surface Features (R)	Tidal Turbine Development Platform: Seakeeping and Safety (R)
Non-Contact Motion Sensor - EFI (I)	Composites with Electronic Spectle Pattern Interferometry (ESPI) (R)	Wave Energy Conversion Buoy (R)
Electro-Chemical Machining (ECM) Lathe- TURBOCAM (I)	Tensegrity Modeling of Biological Systems (R)	Wingtip Devices for Marine Applications (with Focus on Turbines and Vehicles) (R)
Test Fixture for Rifles - Sig Saur (I)	Design and Optimization of Strategies to Reduce Drag Forces (R)	The Poseidon Project (Sea Floor Mapping) (R)
CoolSim (I)	Design, Simulation, Fabrication, and Testing of a 1m Scale Research Wind Turbing Rotor (R)	Living Bridge (R)
Predictive Modeling of Bearing Ring Stress - New Hampshire Ball Bearing (I)	Electrochemical Micromachining - Mikros Manufacturing, Inc (I)	Kelp Aquaculture (R)
Water Cannon Themed Element for Six Flags New England (I)	Evaluation of Compact Heat Exchangers Using OpenFOAM (I & R)	
	Manufacturing Automation (I & R)	

UNDERGRAD & GRADUATE SPOTLIGHT

Engineer and Volunteer

Lena Downes is a junior in Mechanical Engineering. She just finished her fall semester studying at Universidad Carlos III in Madrid, Spain. In Madrid, Lena continued to work on increasing her fluency in the Spanish language as she progresses towards completing her Spanish minor. Over the summer, Lena worked as a mechanical engineering intern at the Marion, MA office of Lockheed Martin. She worked on several different projects within undersea warfare, mainly focusing on developing CAD models for the Expendable Mobile ASW Training Target (EMATT) program. Lena also travelled to San Pedro de Casta, Peru with Engineers Without Borders (EWB) in August in order to work towards improving the water quantity and quality in this rural mountain village. Lena has been grateful for the international perspective that her recent travels have given her, saying "I hope to keep traveling and applying my education towards engineering problems on an international scale." She will serve as secretary for EWB in the 2017 calendar year. Lena is also involved in the Society of Women Engineers (SWE), with which she volunteers at local middle schools. Lena will serve as co-chair of the SWE professional series in 2017. Citing SWE's influence on her choice to stick with engineering, Lena says "I think SWE provides a really important support structure for those in CEPS who might not have many other people to talk to about the nuances of being a minority in the engineering world."

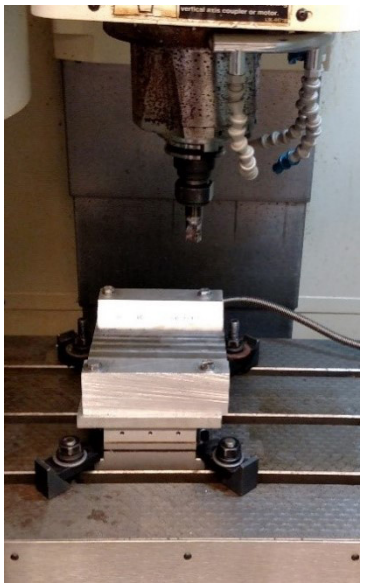
Smart Machining

Jonathan Shepard is a second-year Master's student working under Professor Barry Fussell. His thesis work is a continuation of developing smart machining technologies. Smart machining is the process of adding sensors and control systems to CNC (computer numerical control) machines to better automate milling and turning operations. The ultimate goal of smart machining is to make machining more safe and efficient.

The specific topic being researched is chatter detection. Chatter is unstable vibrations of the tool. These vibrations not only leave a rough surface to the piece being manufactured, but can continually increase in amplitude, causing major damage to both the tool and machine. For this reason, development of a detection algorithm is very desirable. This would also allow for the development of a control system that would automatically alter the machining process when chatter is present.

Outside of school, Jonathan practices Uechi Ryu, an Okinawan style of martial arts, and when there is not snow on the ground, enjoys long rides on his Harley. Jonathan also volunteers for FIRST robotics tournaments at UNH.

The photo to the right shows the inside of the CNC machine and a piece of material about to be cut. Below the material is a dynomometer that measures the cutting forces.



FACULTY SPOTLIGHT

Sensing the force with Professor Fussell

Prof. Barry Fussell graduated from The Ohio State University with a B.S. in Mechanical Engineering, and subsequently worked for the Timken Company of Canton, Ohio in bearing design and product manufacturing. He returned to Ohio State and received his M.S. and Ph.D. in Mechanical Engineering with a specialization in systems modeling and controls. His research was on model reference adaptive controls applied to machining processes. He joined the University of New Hampshire Mechanical Engineering (ME) department in 1987 as an Assistant Professor, and remains there now, as a Full Professor.

While at UNH, Prof. Fussell has been heavily involved in both teaching and research. He has taught sixteen different courses over the years, ranging from statics/dynamics to nonlinear control systems, and has introduced several elective courses such as electromechanical analysis and design. He has also taught the Junior and Senior lab courses numerous times, and has helped revise and update the lab courses during curriculum changes. In addition, he has worked with a large number of undergraduates on their senior design projects. Examples are an electric commuter bike, a firefighting robot, and a wireless force sensor.

Prof. Fussell also has been active in research on machining processes and electromechanical systems. His specific interests include cutting force modeling and control, machining process optimization, sensor development, and brushless/stepper/induction motor analysis and design. His research has been funded by the National Science Foundation (NSF), Air Force, Society of Manufacturing Engineers and industry. Prof. Fussell, along with Prof. Emeritus Robert Jerard, established the Design and Manufacturing Lab at UNH around 1990 to house a computer numerically controlled (CNC) milling machine, obtained from NSF funding, and to provide equipment and space for graduate and undergraduate students to carry out sponsored research. A similar lab for the electromechanical work was created by Prof. Emeritus Charlie Taft and in 1993 it was handed over to Prof. Fussell. Since arriving at UNH, Prof. Fussell has advised or co-advised more than 50 graduate students and published over 100 papers in journals and proceedings, with many students and colleagues as co-authors. Over 60 of the papers have been presented at conferences.

Prof. Fussell resides in Durham, NH with his wife and best friend Jane. Easy access to trails and back roads provides the opportunity to run, bike, and ski/snow shoe year round. His studded bicycle tires enable him to bike to work through the winter. He has been known to swim at the indoor and outdoor pool on a regular basis, and enjoys his annual Katahdin hike with his good friends. During the summer, he makes regular visits to Kittery to sail and race with friends, and to enjoy the beautiful views of the harbor and sea.

ALUMNI/COMPANY SPOTLIGHT

From brewing to sweets
Melanie Payeur
B.S.M.E 2007

Upon graduation, Melanie began working for Anheuser-Busch in Merrimack, NH. She first worked shifts supporting high speed packaging processes. She then transitioned to a Reliability Engineering role where she was more deeply involved with a specific production line (glass bottles). She analyzed sources of unplanned production downtime, and component failure rates in order to prioritize routine maintenance, planned repairs, modular overhauls and process improvements. The majority of her tenure at Anheuser-Busch was spent in this type of role, but she considers herself fortunate to have also had the opportunity to manage production in both high speed packaging and in the brewing/fermenting process. Brewing and fermenting are both batch processes. Therefore, the sense of urgency and overall operation challenges are very different from high speed packaging.

The diversity of her roles with Anheuser-Busch prepared her for a different role with another food manufacturer. In 2012, Melanie joined Lindt & Sprungli (USA) based in Stratham, NH as a Project Engineer, where she still works today. She is responsible for projects related to capacity expansion, new product development, and process improvement. Examples of recent milestones include engineering and installing a high speed capacity expansion, and automating the mixing of liquid flavor and solids into chocolate prior to molding. Her passion for manufacturing is based on the constant opportunity for continuous improvement. She credits the start of this passion to a Manufacturing Engineering elective she took during her Freshmen Year at UNH. You could say it turned into a 'sweet' job.

WILDCAT TALES

Samuel Cole, B.S.M.E '16
Sam presented his senior project "Mirco Tube Bending Machine," which he co-worked on with Eric Desjardins (B.S.M.E. '16) at the Student Design Competition at the ASME MSEC at Virginia Tech and won third place.

Paige Balcom, B.S.M.E '16
Paige received a 9 month Fulbright grant to research aquaponics in Uganda. Paige is working with Makerere University and an NGO called ChildVoice International (CVI) to build an aquaponic system at CVI and educate local farmers about aquaponics. Paige said, "I'm also really enjoying living in Uganda-the people are so welcoming and friendly!"

Kristin Roy, B.S.M.E '14
Kristin Therrien Roy and Derek are the proud parents of Coltn Arthur, who was born at 2:43pm, on December 6th in Alaska and weighed 7lbs 7 oz. He's doing really well and growing so fast.

Andrew Harmon, B.S.M.E '11, M.S. '12
Andrew married his wife, Hayley (UNH Biology '10) in July 2014. They have a beautiful baby girl named Yara Joan who was born in April 2016. Andrew said, "I've had an exciting few years of industry experience so far working as an algorithms engineer, with a primary focus on developing sensor fusion algorithms for navigation, orientation, and perception systems for both defense and commercial applications." Andrew specialized in signal processing for navigation systems, first at The MITRE Corporation, where Andrew studied inertial navigation, GPS, and computer vision, and now at SignalQuest, a small company in Lebanon, NH that builds rugged-packaged sensor systems for orientation and navigation applications on mobile robotic platforms. Andrew also said, "It's been about five years since he graduated from UNH, and I 'm extremely grateful for the outstanding education I received through the ME program!"

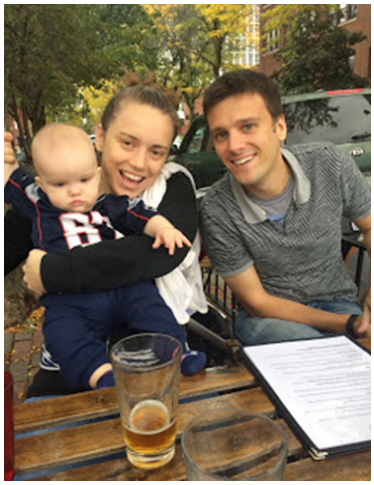
Josh Lent, B.S.M.E '07
Josh was recently promoted from Senior Manufacturing Engineer to Manager of Manufacturing Engineering at Vapotherm (medical device company in Exeter, NH) focused on respiratory technology. In addition, Josh and his wife, Caren, welcomed their first child, a daughter, to the world in August. All are happy and healthy! Josh is currently pursuing a degree in Robotics and Automation.

Marcus Proctor, B.S.M.E '07
Marcus has accepted a position at ClearMotion, a startup in Woburn, MA with Graham Dowie, a fellow UNH FSAE team member. They are working hand-in-hand with graduates from MIT and Carnegie Mellon. Marcus said, "I feel FSAE, Prof. Thein, and UNH made this happen."

WILDCAT TALES

Matt Derov. B.S.M.E '06, M.S. '08

Matt and his wife Kathleen welcomed their first child Timothy and he started crawling last week which was pretty exciting. Timothy was a chicken (or duck) for Halloween. They are still enjoying living in Chicago. Matt took a new role at 3DS early this year with their high end simulation brand called SIMULIA (aka the FEA product Abaqus). He is definitely enjoying this role, and Matt gets to interact much more with engineering analysts and talk a lot more about how they can use their software to tackle their most complex analysis problems. Kathleen is a palliative care nurse at Northwestern, although she is now part time. She takes Timothy on the bus to work with her (his day care is very close to her office) on Mondays, Wednesdays and Fridays, and is home with him Tuesdays and Thursdays.



Dave Hall, B.S.M.E '86

Dave is still running Kona DataSearch (Enterprise Search Software for Salesforce) out of the Nashua, NH area. He's also advising several startups including GlucoSight, a novel way to check diabetic glucose levels through your eyes. Dave is now a grandfather and sending off his youngest to college next year.

Andrew Kingman, B.S.M.E '79

Andy and Nancy (BS in Occupational Therapy '79) have been living in Carlsbad, CA for the past two years as Andy has been working on obtaining all of the permitting and contractors for the second large seawater desalination project (50 million gallons per day, Huntington Beach, CA). The goal is to start construction before the end of 2017. Andy has been with Poseidon Water LLC for almost 20 years, and as the Company's Executive Vice President, he has lead the permitting, contractor selection and financing for all Poseidon's projects including the largest seawater desalination project in the Western Hemisphere, the Carlsbad Seawater Desalination Project. The $900M Carlsbad project has now been operating for 11 months and has produced over 15 billion gallons of drinking water to date, helping reduce the 5 plus year drought that has plagued southern California. Andy and Nancy try to get back to their apartment in Boston as often as they can (Poseidon is headquartered in Boston) and look forward to moving back to New England, going to the new Wildcat Stadium, and skiing on New Hampshire snow sometime in 2017 once the Huntington Beach project gets a little closer to construction.

Ed Chartrand, B.S.M.E '59

Two years ago Janie (Worthen) and Ed Chartrand sold their NH home and moved to Birmingham, AL to be nearer their six children. Ed said, "it was a good decision." They also sold their VT lake property and shipped the pontoon boat down to Smith Lake in AL where it gets a lot of use from their children. Ed said, "We never expected these two Yankees would like it here, but we've fit right in with the neighbors and it is great seeing our children, grandchildren and great-granddaughter. By January we will have three great-grandsons." Last spring, Janie's UNH roommate, Carole Mahoney Hayden and her husband, Jim, came for a week to soak up some sun. Both Ed and Janie still root for the Red Sox and Patriots! Go Pats!

Robert Rosenblum, B.S.M.E '57

Robert and his wife are looking forward to their 59th anniversary and watching their family mature, They have a granddaughter in her second year at the (University of Hamburg) taking Electrical Engineering and Computer Science and she is doing well. Another granddaughter started at NOVA (Northern Virginia) and is also doing well. They are enjoying life in Poinciana, Florida away from the crowded coastal areas in an active adult community.

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The Mechanical Engineering Faculty, Staff, Graduate Students, and Undergraduate students deeply appreciate the support that we have received from our generous donors.

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To donate, visit the CEPS homepage, and select the Donate tab located on the far right menu bar. From there you can select one of the Mechanical Engineering funds (or others of interest, e.g., Engineers Without Borders, Society of Women Engineers, etc.).

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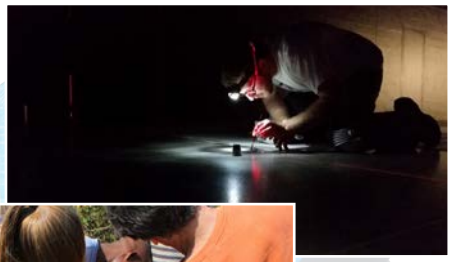





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