Dean's Remarks

Let me highlight a few items not included elsewhere in this expanded edition of *TCoE Trends*:

► 194 freshmen entered the college in the fall of 2015. This is the largest freshman class in the history of the college.

► With support from the Kern Family Foundation, we continued to create e-learning modules that help develop an entrepreneurial mindset in our students. Two new modules, titled "Thinking Creatively to Drive Innovation" and "The Elevator Pitch – Advocating for Your Good Ideas," were created. Facilitated by a mini-grant program, seven faculty members from Lafayette College, Santa Clara University, Ohio Northern University, University of Dayton, and Villanova University deployed five of the modules we developed in their courses.

► We completed the Project to Integrate Technical Communication Habits, funded by the Davis Educational Foundation, by developing three online modules to help students develop their technical writing skills. The first module, titled "Short Engineering Reports," will be tied to a freshman course. The second module, titled "Formal Reports in Engineering and Applied Science," will be tied to third-year laboratory reports in each discipline, and the third module, titled "Written Communication in Engineering Design," will be tied to senior design courses in each discipline. This integrated approach — spanning multiple years and leveraging e-learning technology — is innovative and quite unique within engineering education.

► The first cohort of seven students who began their master's program in Data Science — offered in San Francisco in partnership with Galvanize — will graduate in April 2016. These students completed internships and capstone projects at leading companies that span a variety of industries and include NASA, Blue Coat Systems, PowerScout, Mashable, DocuSign, Wine.com and MetroMile. In a discipline that struggles to attract women, we are thrilled that 26% are women within the current enrollment of 42.

R. Harichandran

Ron Harichandran, Dean

Time to Get Tough

Confronted with a panel of hard-to-impress investors, students at UNH's first 3 Day Startup event showed they were tougher than all of them.

Sensitive? Please. Just because our students came up with some great ideas, poured their hearts and souls into working on them, pounded the pavements doing market research, and then rehearsed their investment pitch for hours, didn't mean they would fold under the sort of biting critique straight out of TV's Shark Tank.

But a veritable "shark tank" it was, and the entire experience, coupled with their smashing success, has put a number of UNH students much farther along the path to professional maturity.

A 3 Day Startup event is a 72-hour learning-by-doing campus workshop that teaches entrepreneurial skills to university students in an extreme hands-on environment. Participants gain experience in cross-disciplinary collaboration, brainstorming and ideation, group productivity, ad-hoc leadership, and decision-making under severe time constraints. The 3 Day Startup organization itself was founded at the University of Houston by exasperated students, burning with the Big Idea, who didn't want to wait until after graduation to launch their business start-ups. The organization now has a 26-country, six-continent presence.

This was the first 3 Day Startup event ever held at UNH — actually the first in the entire state of Connecticut — and it drew students from four colleges across the UNH campus: the Tagliatela College of Engineering, the leader of the event; the College of Business; the Henry C. Lee College of Criminal Justice and Forensic Sciences; and the College of Arts and Sciences.

Mentors Mike Ambrose (left) and Ben Muskin (right) give students a few pointers on their project.

The event took place the weekend of November 6th through the 8th and followed a schedule that was rigorous and deadline-driven. Basically, the weekend went down like this:

Friday: The 46 students previously chosen to participate arrived on campus, either with or without start-up ideas for a product, invention, or company. They commenced brainstorming, attended a workshop on how to make a presentation, and worked with mentors. Each student presented an idea, after which all students voted on the best eight of the 46 ideas and divided themselves into eight teams.

Saturday: The teams started doing their market research — talking to potential customers in person. Team engagement with mentors intensified and included immediate feedback sessions. There was a strong focus on business model generation.

Saturday night: Time to swim in the "shark tank." The teams pitched their ideas to a panel of venture capitalists, angel investors, and accomplished entrepreneurs who asked hard questions and looked for vulnerable areas. Team members took it on the chin and emerged with plenty of fight left.

Sunday: The teams made an early-morning comeback, turning the previous night's critique and candid advice to their advantage and working on leads. They refined their ideas for a final presentation on Sunday night.

No Shortage of Enthusiasm

The event was truly University-wide and included many alumni who donated their time by acting as mentors. Each of the four colleges and the entire TCoE Board provided funding, and several companies gave financial support as well.
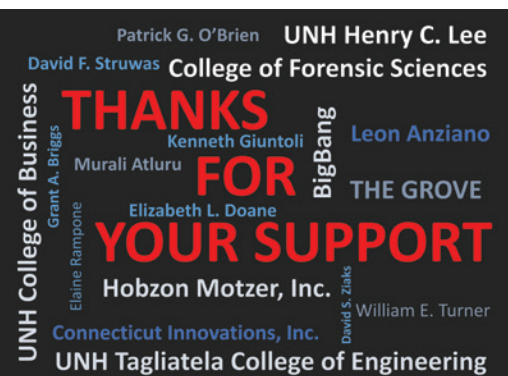
Connecticut Innovations, a leader in financing and ongoing support for the state's innovative and growing companies, and Sikorsky Aircraft Corporation were two of the companies that were all in for the event. Said Sikorsky's Mike Ambrose, a UNH alum and one of the event's mentors: "I was really impressed by the students during my review of their projects. Great energy, some good ideas, and good communications skills. This event is definitely something that should be continued."

Meanwhile, several Connecticut law firms donated their legal expertise through lunch talks. Dilworth IP, experts in intellectual property law, was one of the firms. Anthony Sabatelli, a partner there, spoke on "Patent Basics for Entrepreneurs," crucial knowledge for budding inventors.

Dedicated faculty members Maria-Isabel Carnasciali, assistant professor of mechanical engineering, and Jean Nocito-Gobel, professor of civil and environmental engineering, who, as usual, never punch a time clock when it comes to helping their students, gave up their entire weekend to the event in addition to assisting TCoE student leaders Jonathan Spiegel and Austin Matthews in the weeks-long planning phase. Dr. Carnasciali, faculty advisor for the event, explained the devotion: "We wanted the students to have an understanding of what they have to do to bring their idea to life — to learn about teams, customer feedback, pitching, revenue options, rapid proto-typing, and how the real world works."

Spiegel and Matthews also had the help of Dr. Hesam Panahi of the University of Houston, who mentored and ensured that the program met the 3 Day Startup standards for quality and impact. "The students came out of the weekend motivated and ready to continue with their ideas," Panahi enthused. "Many of the students came from an engineering background, and this was a great opportunity for them to see another perspective on product development."

Although the teams were a diverse mix of students from all four of the participating colleges, the TCoE was heavily represented in the mix — six of the eight teams included TCoE students, and the other two teams comprised TCoE students alone.

Inventions that Resonate with People

So, what types of products did the teams come up with?

One team dubbed their invention "Charger Guard," a device that prevents the kinking of cell phone charger cords where they connect to the phone — an annoyance that often results in the cord cover splitting open. The team put in plenty of legwork during their market research phase, hitting the street to ask cell phone users how many chargers they go through in a specific time period and how much they would pay for a solution.

Daniel Delgado presenting his Charger Guard project to the panel.

Another team's idea was called "EMtech," a smartphone app designed to provide a more dependable and efficient system of communication between ambulances and hospitals. The team conducted interviews at several area hospitals — Yale-New Haven, its St. Raphael campus, and the Yale-New Haven Children's Hospital — talking to nurses and doctors in the ER as well as to the EMTs and paramedics in the ambulances parked outside. Demonstrating how on-target the team's idea was, one doctor's wish list described everything the team planned on doing with their app — without the doctor even knowing an app was in the making.

Meanwhile, a "What To Do" app piqued a lot of interest on the Yale University campus, especially among international students. Not being familiar with the area, it seems that a lot of them just haunt the coffee shops on weekends because they don't know what else to do.

Possibilities

Was UNH's first 3 Day Startup simply a valuable exercise, or do any of the projects have prospects in the real world? Actually, there may be a future for three of the projects, whose teams received sufficient encouragement at the event to continue development. "We're in the process of organizing follow-up presentations during Engineers Week in February," said TCoE Dean Ron Harichandran.

For students still brimming with the energy of this 3 Day Startup, the possibility of more funding to develop their projects further has energized them even more. Having already "swum with the sharks," they're ready for whatever comes their way.
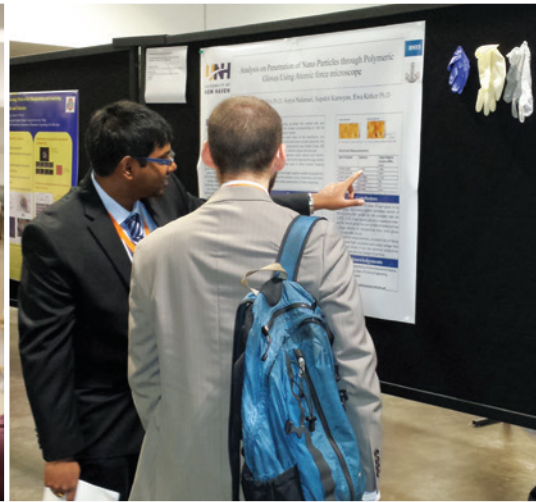
STUDENT RESEARCH PROJECTS THAT ARE HOT RIGHT NOW

Effects of Shrouds or Lenses on Wind Turbine Flow Fields

Yi Mai, mechanical engineering graduate student.
Advisors: Assistant Professor Maria-Isabel Carnasciali, Associate Professor Samuel Bogan Daniels. The project involved adding shrouds or lenses to encase bare wind turbines in order to increase efficiency. Shrouds are analogous to lenses in that they focus wind much like lenses focus light. The goal was to compare air mass flow through a bare wind turbine vs. the maximized air mass flow using the shrouds. Computational fluid dynamics was used to create the geometry of the shrouds, to do the computations, and to display the results. The simulation shows that a strong vortex forms behind the edge of the shroud, and wind velocity accelerates even further near the entrance of the shroud. In fact, early calculations show a three-fold increase in output power compared to the bare wind turbines due to the concentration of wind energy.

Analysis of Oil and Gas Supply Chains Using Continuous-Time Discrete-Event Simulation

Zaid Kbah, engineering and operations management graduate student. Advisor: Assistant Professor Nadiye Erdil. Simulation is an essential tool that is widely used to understand supply chain behavior in order to achieve business objectives. This project explored the development of a computerized hybrid Continuous-Time Discrete-Event simulation for oil and gas supply chains by using Arena simulation software. Random proprieties were incorporated by assigning theoretical distributions to system variables and control algorithms in the simulation model. A real case of a natural gas supply chain was mimicked using the simulation approach to analyze and measure the impact of the disruption risks on the supply chain performance and Key Performance Indexes (KPIs).

### Are Gloves Used for Lab Work Porous? Method to Measure the Leakage of Gloves

Surya Nalamati, electrical engineering graduate student.
Advisors: Professor Saion Sinha, Dr. Ewa Kirkor. Ranging in size from nanometers to microns, viruses are easily transmissible and dangerous to humans, animals, and plants. Gloves afford first-line protection from these extremely small organisms and other biological and chemical hazards. Different types of polymeric gloves are available for different applications. This project tested different types of gloves for their propensity to form pinholes and voids when subject to wear. Experiments were performed on plain Nitrile, latex, and vinyl gloves. Holes invisible to the human eye were detected using multiple-walled carbon nanotubes (similar in size to viruses) and graphite coatings on the gloves. Percolation of carbon nanotubes through the gloves was observed using an Atomic Force Microscope (AFM) and also by an appearance of frequency-dependent electrical capacitance of the graphite coating. The results support the use of AC capacitance as an economical and easy way to implement tests for otherwise indistinct pinholes in polymeric gloves.

Preventing Printer Data Leakage

Kyle Anthony and Devon Clark, computer science graduate students.
Advisors: Assistant Professors Frank Breitinger and Ibrahim (Abe) Baggili. The students have developed a novel and open-source technique for data leakage prevention in printers. The goal was to prevent documents from being printed by comparing them to a reference dataset beforehand. To solve this problem, the printer job was interrupted, and the documents were converted into text and then automatically compared against a reference database by utilizing approximate matching. The results show that this is a valid approach for data leakage prevention. However, additional testing is required to determine the overall performance.
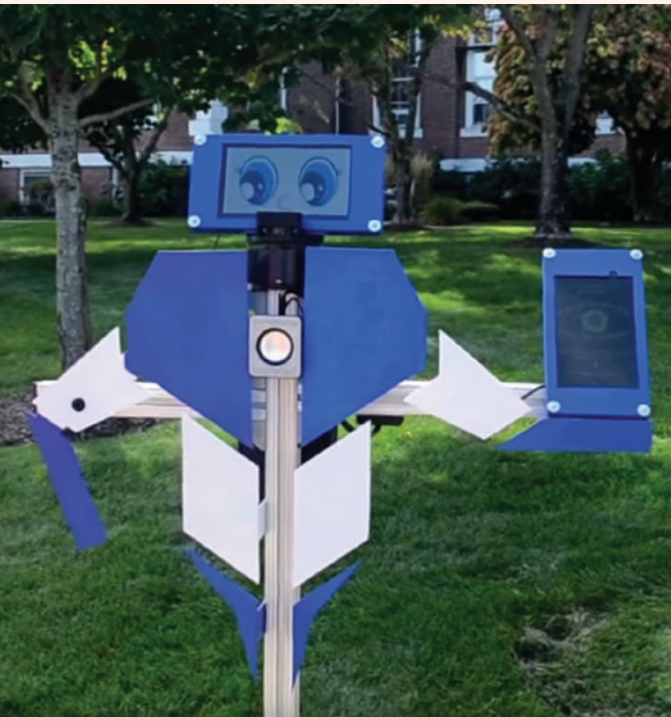
Of course I can talk. I'm a robot, aren't I?

Talking is just for starters. Ada the Robot has a lot more going for her than just commenting on the weather to the startled people who approach her.

We use the term "her" loosely. She has a head that can move and a torso that can turn, and she's pretty cute, but her given name is in honor of Ada Lovelace, considered the first computer programmer for developing the first algorithm carried out by a machine.

The creation of graduate student Devon Clark, who is working on his master's in computer science, Ada has a brain that can teach you all about cyber security and check to see if your emails have been hacked or your bank accounts have been compromised. She can crack jokes, read Tweets, and even spring a pop quiz on you.

The brain Clark gave her is an Android tablet running a custom application that controls her interactions and the things she says. The robot also has hardware to control her head movements and a motion sensor that allows her to turn and sense people who are coming in for a closer look. You can engage in an actual conversation with her by pressing the microphone button. And those big eyes of hers? Daniel Walnycky, another graduate student gave her those, along with her interface.

Ada's knowledge of cyber security comes from her very own Twitter account, @ADA.SecuroBot. The content is continually updated with tips, articles, RSS feeds, retweets, jokes, and a plethora of pithy information from the modest-but-brilliant members of the UNH Cyber Forensics Research and Education Group (UNHcFREG).

Said Clark, "This idea started as a project for an intro to cyber security course, and it just took off and grew into this." The robot was then completed as part of an education research initiative with UNHcFREG. All told, 400 hours went into Ada, most of them within a time span of just a few weeks last summer.

Ibrahim Baggili, Assistant Dean of Engineering and Director of UNHcFREG, observed, "The project far exceeded what most class projects accomplish. Ada was a time-consuming, high-level engineering project, and its applications are all open source so that others can adapt her for other teaching projects."

No one is more on board with the open source idea than her creator, who thinks of Ada as much more than a novelty that people get a kick out of. "Ada really does teach an important lesson in cyber security to younger kids who may not know a lot about the topic," said Clark.

Reducing the robot to its essence, he added, "Ada is basically a computer teaching people about computer safety."

Wonder what she'd say to that.

The Chemistry and Biology of Hope for Adults with Leukemia

Until 1970, the survival rate for a child with leukemia was just 10 percent. Today, 90 percent of children with leukemia will live at least five years. Unfortunately, the outlook is much dimmer for adult leukemia cases. Adults with some leukemia subtypes have a five-year survival rate of less than 10 percent. Can better drugs be discovered to transform leukemia treatment?

Dequan Xiao, an assistant professor in chemistry at the University of New Haven, and Jun Lu, an associate professor of genetics at Yale, have set out to do just that. Collaborators for the last two years, they are using a multi-disciplinary approach that relies on both chemistry and biology to discover drugs that could someday eradicate leukemia.
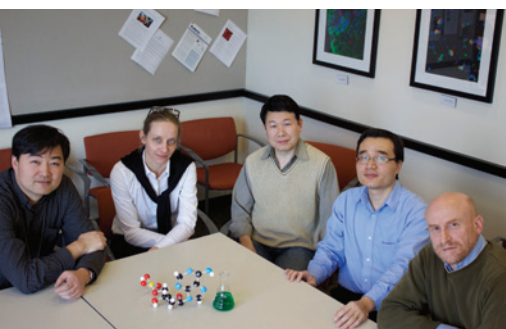
The Yale-UNH research team working for leukemia drug discovery: Jun Lu (Yale), Stephanie Halene (Yale), Jijun Cheng (Yale), Dequan Xiao (UNH), and Pier Cirillo (UNH), from left to right.

Recently, their work got a major boost. Teaming up with Stephanie Halene and Jijun Cheng of Yale, they submitted a proposal to the Connecticut-sponsored Program in Innovative Therapeutics for Connecticut's Health (PITCH) and were accepted. They now will work closely with scientists at the Yale Center for Molecular Discovery on this critical drug discovery effort. Their work will be part of a three-year, $10 million investment supported by the Connecticut Bioscience Innovation Fund. Translational research will be pursued based on their basic research, with the end goal of developing a prototype drug and a commercial start-up to continue developing it.

"This is an exciting way for basic research to be translated to potential commercial products and then put on the market," Xiao said. "We will work together with the PITCH program to discover pre-drugs that restore health to leukemia cells and to significantly enhance our success rate of discovery.

"The research and its results will also have a positive influence on our study and help us to understand more about the fundamental biological processes of leukemia and other cancers of the blood," he added.

Xiao's work is centered on analyzing the structure and the basic chemical processes of biological molecules — such as the proteins and DNAs related to leukemia diseases — using computational chemistry methods and chemical synthesis. Over the past two years, with the efforts of students and Pier Cirillo, senior lecturer of chemistry at UNH, Dr. Xiao's lab has designed and synthesized several organic compounds that have the potential to alter the function of leukemia-related biological molecules.

TCoE Students Dominate the 2015 Graduate Student Showcase

There were many standouts among the research projects displayed at the 2015 Graduate Student Showcase on November 10, but one thing in particular attracted everyone's notice: UNH engineering students have an exceptionally high level of engagement in research. Every one of our graduate programs was represented. And, although the Showcase pulled together graduate students from all five of the University's colleges, 24 of the 50 students who participated were from the TCoE.

As in years past, the exhibits consist of posters describing a project the students are working on. Two of the top five winners this time were from the Electrical & Computer Engineering and Computer Science department. These two winners had prototypes to showcase. One was Ada, the Cyber Security Education Robot — which can prompt quizzes about cyber security, read Tweets, tell jokes, and carry on a simple two-way conversation — and a cyber security education game called Symmetrics, which teaches you how to hack for ethical purposes. In other words, to protect an organization by testing the limits of its security system.

Assistant Professor Frank Breitinger of the department observed, "A lot of the other TCoE research was great as well — but hard to understand if you are outside of that area." The judges for each poster were not allowed to be involved with that particular project, so the skinny-but-charming visual of Ada and the video-game appearance of Symmetrics helped in making those projects more understandable.

Do engineering students have an "unfair" advantage over students in UNH's other four colleges when it comes to showing their stuff? Well… in a way. "We have active research groups in our college, and many of them generate projects," explains Breitinger. "In addition, all of our students have to do an internship, which is also a great experience and worth a poster, so usually the number of TCoE students in the Graduate Student Showcase is rather high."

We plan to keep it that way.

Giving a Cutting Machine a Bit More of an Edge

A mechanical engineering project begun in high school comes to college with its creator for some final tinkering.

When Austin Thomas, high school senior, came in second in UNH's Kaufmann Scholarship* competition last year, that wasn't the cut-off point for his project as far as UNH was concerned. The project, a tabletop cutting machine, has gotten a fresh infusion of funds from the TCoE, so that Thomas, now a freshman, can continue to work on his creation.

It was a very close second place. Dean Ron Harichandran was so intrigued with Thomas' machine that he wanted to see Thomas take it through to final development.

The freshman mechanical engineering student has a clear vision of what he wants to accomplish with his project — make a cutting machine that is less costly than the models currently in existence so that the average mechanical engineering student can own one.

Thomas' model has evolved to a 2' x 2' version, still small enough to not overwhelm a dorm room. It has an aluminum exterior, held together with rods and screws from specialty hardware stores. Some of its parts were made with a 3-D printer, so those are plastic. It will cut anything that is softer than steel. And, it will cut all kinds of shapes for all kinds of engineering projects.

How does the cutter know what shapes to cut? First, Thomas designs what he wants using CAD (Computer-Aided Design) software. He then converts the shape to code in CAM (Computer-Aided Manufacturing) software. The code is then sent to the cutting machine's Arduino microcontroller, which runs three motors that control the X, Y, and Z axes. "Essentially, it's converting shape to numbers and numbers to movement," Thomas explained.

Since cutting machines already exist, Thomas cannot look toward patenting his machine, but what he does have in mind is sharing his design by making it open source. "I would make the plan on how to put the machine together universally available so that others can buy the parts and assemble the machine themselves," he enthused. "That would make it cheaper."

Thomas put the final touches on his creation over Winter Break so that it could be ready for Accepted Student Days in the spring, during which he showcased it.

What else went into his cutting machine besides metal and plastic and computer software? A huge chunk of discipline and the trademark love of tinkering that mechanical engineers possess in abundance.

"I knew I wanted to be an engineer when I was 14. But then I realized it wouldn't just happen — I had to work at it. That was when I decided to enter the Kaufmann Scholarship competition."

It was a good decision. In fact, it was sharp. Very sharp.

The University of New Haven's Richard O. Kaufmann Scholarship is granted to one high school senior every two years. The Scholarship is a gift of $150,000, which covers all four years of study at UNH.
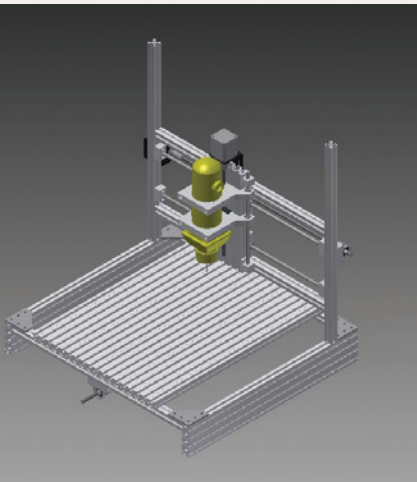
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Amir Esmailpour: Envisioning a world where Internet hotspots never grow cold

Walk into any coffee house and you're likely to be in a Wi-Fi hotspot. Your device can access the Internet and you can sit there, sipping and ignoring everyone, while you talk on the phone, browse, shop online, send emails, or play computer games.

Walk out the door, and you're out in the cold, Internet access-wise, until your device makes a rough reconnect to work off the nearest cell tower — often dropping your call.

What a pain.

And what an exciting challenge for Amir Esmailpour, assistant professor in the Department of Electrical and Computer Engineering and Computer Science, with a twelve-year-long passion for wireless technology research. "The technologies for WiFi and cellular are completely different," he explains. "If you're connected to WiFi, it doesn't smoothly switch over to cellular. There's a lot involved in making the transition between the two. In the future, we want the transition to be seamless from one technology to the next and not even noticed by the user."

Toward that end, Esmailpour and his students are working on a common interface that will enable these technologies to come together and, in essence, "speak the same language."

So, why don't they speak the same language now? Whence this Tower of Babel that makes WiFi and cellular, as well as other wireless technologies, unintelligible to each other?

Look to the international bodies that establish the standards for each technology, declares Esmailpour: "Organizations such as the Institute of Electrical and Electronics Engineers Standards Association (IEEE), the International Telecommunication Union (ITU), and the 3rd Generation Partnership Project (3GPP) have given the various wireless technologies different sets of rules and regulations to change the information from data into the signal and to capture and transmit the signal."

You may ask: What on earth were they thinking? Fundamentally, it was a different set of priorities. Security, quality of service, power management, and mobility management were the prime driving forces behind the creation of those incompatible standards. Now, however, sheer convenience is about to trump all of that. The sheer convenience of the user, that is. "All of our research and technology is based on user demand," remarked Esmailpour. "Whatever the users want, we must do the research to provide that. Users want to move from their house (WiFi) to their car (cellular) and have the transition take place smoothly, so we are developing solutions for that."

Esmailpour was recently awarded an injection of funds to find those solutions. Named a 2015 University Research Scholar, he is receiving financial support for the next three years and has used his well-deserved funds to buy equipment for two labs — the UNH wireless research group (UNHwRG) lab and a cloud computing/big data lab. He has also hired students who practically live at the UNHwRG lab as they work on that vitally important common interface — or gateway — that will integrate WiFi, cellular LTE, and WiMAX. (WiFi delivers short-range Internet access, while cellular LTE delivers high-speed broadband access over a wireless connection and works over relatively long distances. WiMAX provides intermediate access.)

Such a gateway can be thought of as a central unit or central node, explained Esmailpour. The node would be able to communicate with all of the different wireless technologies as well as control and manage them. Which brings up a couple of highly salient points. Who will control the node? And where will it be located? A lab somewhere? The basement of AT&T? Esmailpour has a better location in mind: the Cloud.

Cloud Formation — From Storage and Back-up to Colossal Service Provider

We all remember when the Cloud first made its appearance on the tech horizon. It offered off-site storage for family photos and important documents to protect against loss should your hard drive or local server crash. However, the Cloud has evolved rapidly since then, taking on new dimensions and capabilities. For one thing, the Cloud is now offering apps that you can download to your computer instead of the costly alternative of buying them and loading them onto your hard drive. You simply pay a small rental fee. Even more exciting is the concept of an entire Virtual Machine. Your computer simply becomes a workstation and you access everything you need for it — operating systems platforms, apps, infrastructure, and other services — i.e., a Virtual Machine — from your Cloud provider as a service package.

Esmailpour envisions a service package that would include locating the central node on the Cloud with the ability to manage it and access it any time from anywhere in the world. He has referred to the central node as "Cloud RAN" — for Cloud-controlled Radio Access Network.

Finding a Balance of Power

Needless to say, whoever controls the node basically controls the world. Esmailpour notes, "There will be a very complex control system that will have to involve several entities, not just a single one." Those entities include: the non-profit international standards bodies, which set the rules and regulations that control the technology; the vendors who actually build the technology; the service providers; and government bodies, such as the FCC.

If there's one word to describe the spread of the Cloud into every aspect of society, it's "inevitable." "In the near future, every field that you look at — libraries, biology, astronomy — any field at all — will have something to do with cloud computing and big data," maintains Esmailpour. "It's virtually a no-brainer because cloud computing will make things simpler, more convenient, and less expensive."

International Recognition

For now, though, there are a couple of conferences to get excited about. Esmailpour's team is thrilled to have had two papers on Wireless Technology Integration accepted by the IEEE ICNC 2016 (International Conference on Computing, Networking and Communications) and the IEEE WCNC 2016 (Wireless Communications and Networking Conference). They'll be traveling to both conferences to enjoy the honors in person.

Somehow, a virtual conference just wouldn't be the same.

Why we spent part of last summer rearranging the chairs

Joe Levert

Greg Broderick

Michael Collura

We simply decided things would work more efficiently and effectively that way. So, we divided one TCoE department in two and created a brand new department as well. End result: three new department chairs.

We split the Mechanical, Civil, and Environmental Engineering department into two separate entities: the Department of Mechanical and Industrial Engineering, now chaired by new hire Joe Levert; and the Department of Civil and Environmental Engineering, with Greg Broderick, veteran faculty member and previous coordinator of the undergraduate Civil Engineering program, as the chair.

Associate Professor Levert comes to UNH from the State University of New York Maritime College, where, as a tenured Associate Professor, he taught 14 different undergraduate engineering courses and established the practice of industry-sponsored projects for the senior capstone courses there. He also has practiced professionally in four diverse industries — fiber optics, semi-conductor research and development, aerospace hardware manufacturing, and oil refining. He has been awarded seven patents and established a successful tribology research effort that greatly reduced aerospace hardware failures.

All Together Now. Meanwhile, our new department entered the scene in August. It's the innovative and unusual shared Department of Engineering and Applied Science Education (EASE). "Shared" is the operative word. The faculty members in this department are people from different disciplines who have their primary home in other departments. The ultimate goal of this new blended family? To serve as a model to show students the dynamic beauty of interdisciplinary collaboration.

"Breakthroughs often come at the interface between disciplines," observes Professor Michael Collura, the new department's chair. "We want the work of this department to be reflected throughout the College to better prepare students for their professional lives."

The project the faculty members will be collaborating on is one of the most challenging in the College: the Multidisciplinary Engineering Foundation Spiral Curriculum (MEFSC). The MEFSC is a set of highly integrated, multidisciplinary courses that begin in the first semester and extend through sophomore or junior year. The curriculum helps students develop a multidisciplinary perspective by exposing them to a broad array of engineering concepts in multidisciplinary settings. This grooms students to face the challenges of the 21st century's game changing expectations of engineers.

Maintaining the integrity of the curriculum, however, is where things can get tricky. The faculty must be careful not to let their disciplinary backgrounds bias the "spiral" curriculum. What's more, the curriculum must be linked to research and scholarship in engineering and applied science education. The faculty and staff in the department must find a way to deal with these competing dynamics and produce a curriculum that advances the best teaching practices and creates visibility for the curriculum model.

Pulling it off will require an amazing amount of collaboration and cooperation. But the students will be watching closely and learning from what they see.

As lessons go, that should turn out to be one of the more interesting ones.
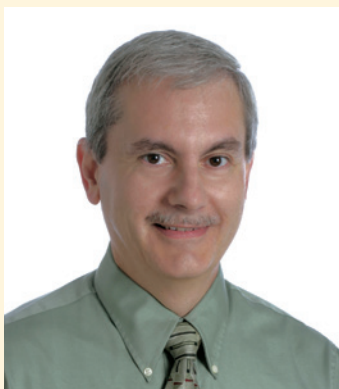
There's New Chemistry in the TCoE faculty

Amanda Simson has joined the College as Assistant Professor of Chemical Engineering. Her start date was last August. Simson received her Ph.D. from Columbia University's Department of Earth and Environmental Engineering, where her research focused on developing more efficient hydrogen production processes for PEM (Polymer Electrolyte Membrane) fuel cells — work that was sponsored by BASF. She also spent two years developing hydrogen production technologies for Watt Fuel Cell in Port Washington, New York.

At UNH, her research focuses on using heterogeneous catalysis in applications such as emissions control and alternative energy technologies. (In heterogeneous catalysis, the catalyst and the reactants are in a different state of matter — such as a solid catalyst with liquid or gaseous reactants.)

Before teaching at the college level, Simson passed on her passion for the STEM disciplines to middle-school students, teaching for three years as part of the Teach for America program. She developed several new programs, including a series of math competitions for students in New York City middle schools.

She is also on a mission to communicate the wonders of chemistry to the elementary school set and, in the process, has added a highly creative element to her résumé. While at Columbia, she started collaborating with

an artist friend who was creating comic books that would make learning science fun for kids. Together with Simson's Columbia lab partner, they have developed a fast-paced card game called "Valence" that uses Ninja characters to teach children chemistry and reinforce simple math skills. The game is targeted to children age 8 and up and will be featured in early 2016 on Amazon. It's available now at **playvalence.com**.

Dr. Ibrahim "Abe" Baggili Becomes Inaugural Recipient of New Chair

The donor who endowed the Elder Family Chair may be anonymous, but its first recipient, Abe Baggili, has made quite a name for himself over the past few years.

Baggili, assistant professor of computer science and assistant dean of the TCoE, is also the founder and co-director of the Cyber Forensics Research and Education Group at UNH and is a University Research Scholar as well.

Baggili's research findings have uncovered security issues in mobile messaging applications that affect more than 1 billion people — findings that have been reported on TV, in print, and online in over 25 languages. His collaborative work and opinions have been featured in *The Huffington Post*,

Thomson Reuters, Nature, CNET, and FOX, among other high-profile media. He has also forged partnerships with both the Department of Homeland Security and the Defense Cyber Crime Center of the Air Force Office of Special Investigations and is currently in discussions with local law enforcement and state agencies to strengthen security in Connecticut. Before joining UNH, he spent time in the United Arab Emirates, where he established the first research laboratory in cyber forensics in the Middle East.

The Chair position will spend three years in the Electrical and Computer Engineering and Computer Science department, then three years in the College of Business and continue alternating on that schedule.

With Abe first up at bat, things are off to a really strong start.

Sikorsky Executive Becomes New Member of the TCoE Professional Advisory Board

We lost one member of the board recently when Sikorsky transferred Chair Andy Bernhard to Florida. But Sikorsky has a way of producing board-worthy candidates from its many University of New Haven alumni. Mark Francis, Director of Manufacturing Engineering at Sikorsky, has stepped in to fill the vacancy. Francis graduated from UNH in '86 with a B.S. in Mechanical Engineering and earned an M.S. in Manufacturing Engineering from Boston University.

Francis' responsibilities at the legendary aircraft corporation encompass the development, implementation, and continuous improvement of manufacturing processes to assure that design-to-cost and producibility are key, measurable attributes for all concepts and designs. He joined the corporation in 1985, and his career there has been one of ever-expanding responsibilities in Manufacturing Engineering, Project Engineering, Operations Management, and Quality. He was appointed Director of Operations Quality in 2006 and General Manager, Aerostructures in 2010, where he was responsible for all aspects of the Aerostructures Product Center, which has grown to more than $1.3 billion in output per year.

William O'Brien Equips Tomorrow's Engineers for the Second Year in a Row

Every engineering college has a wish list, and on that wish list is a lot of shiny new state-of-the-art equipment. William O'Brien, who received his B.S. in Industrial Engineering from UNH in 1964, has, once again, knocked off an item on that list by turning it into a full-blown reality. He recently gave the TCoE a gift of $25,000 toward the purchase of a CNC (computer numerical control) milling machine. The year before, his generosity enabled the College to purchase a 3-D printer, which is now getting a phenomenal amount of use.

O'Brien is the president and CEO of Precision Metal Products in Milford, Connecticut. The company manufactures metals stampings and precision metal parts. His son Sean, who is also a UNH alum, runs the business with him. The gifts, however, are personal gifts from O'Brien and his wife Jean, not from the company. They are in appreciation of the education he received at UNH and the many business opportunities that it afforded him.

By learning on the latest, state-of-the-art equipment, engineering students not only have a better-quality educational experience, but they can offer future employers a more highly polished set of skills and shorten the learning curve on the job.

The gifts from William and Jean O'Brien certainly made a big splash when we got them. But even more important, their ripple effect will go on far into the future.
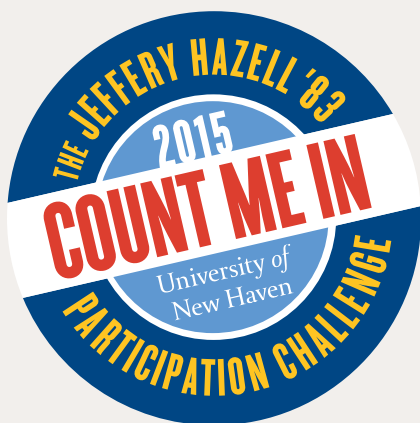
Crowdfunding at Its Finest:
Donors rise to the "Count Me In" Participation Challenge.

Nearly 2,600 donors stepped up with an enthusiastic "I'm in!" to the Jeff Hazell "Count Me In" Participation Challenge. A total of $405,929 was raised through the Challenge's web-based platform and student phonathon, with the average donation coming in at $157. Facebook and Twitter did their part, creating buzz for the Challenge. The donors consisted of alumni, parents, faculty, staff, friends, and students and were spread among all five of the University of New Haven's colleges.

To make things even more interesting, the College with the highest donor participation rate would receive a $50,000 gift from UNH Board of Governors member and alum Jeffery Hazell, Class of '83. The Tagliatela College of Engineering attracted 399 donors, who contributed over $37,000. The $50K, however, went to UNH's Lyme Academy College of Fine Arts.

The funds raised will go to help students on their way to achieving the career of their dreams. The specific priorities are: the Annual Fund for Facilities, which includes classrooms, learning centers, labs, and residence halls; Endowed Scholarships; and UNH Charger athletics.

THE JEFFERY HAZELL '83
2015
COUNT ME IN
University of New Haven
PARTICIPATION CHALLENGE

TAGLIATELA COLLEGE OF ENGINEERING

Patrick "Paddy" O'Brien Recognized for Career as Groundbreaking Engineer and Entrepreneur

It has been over 49 years since Paddy O'Brien received his bachelor's degree in electrical engineering from UNH, but he was back last May, at Spring Commencement, for another, highly deserved degree — an honorary Doctor of Engineering. It was apparent to all that the intervening years have been years of incredible accomplishments.

O'Brien has been a driving force in the aviation ground support equipment industry for more than 40 years and has served as chief engineer for internationally known ground support equipment companies, including Hobart Brothers, Devtec (now TLD), and McCormick-Morgan.

In 1991, he formed MCM Engineering, Inc., a Burlingame, California business that designs and produces solutions used by architects, engineers, and aircraft manufacturers. The company also creates products that are used by leading airlines at airports, airfields, and hangars around the globe. As president and CEO, O'Brien oversees all aspects of MCM's product design, development, and manufacturing.

MCM has a worldwide presence. You can find its equipment in the United States, China, Southeast Asia, Pakistan, Europe, Sweden, and the Middle East. The company also supports all branches of the U.S. military with systems and products that are used from Florida to Alaska.

O'Brien's brilliant innovations in 400 Hz ground power — the type of electric power that is the standard of the commercial aircraft and aerospace industry — were the catalysts that helped transform the industry from mobile equipment to central system design.

In 2011, he received a lifetime achievement award from *Ground Support Worldwide*. Among the accolades the publication gave to O'Brien was their citing the creation of MCM Engineering as one of the most important milestones in the development of ground support equipment. SAE International also gave him a lifetime achievement award — for significant service to the aviation ground support industry.

Like so many extraordinarily creative and innovative people, O'Brien not only looks ahead to what he can do next, he looks back as well — to the college where he got his start and to the students who are at the stage he once was. Thanks to his undying passion for engineering and his genuine dedication to tomorrow's engineers, he lent financial support to the recent 3 Day Startup, where students learned unforgettable lessons in ideation, development, pitching and selling an idea, and making a comeback after criticism.

But O'Brien's biggest gift defies counting or dollar signs. It's simply the inspiration that he provides to who-knows-how-many future engineer-entrepreneurs.

Promises Kept. Legacies Created.

New Haven Promise is a community organization that provides support and college scholarships* to high school students in the New Haven public school system. To many of these students — academically gifted though they are — college seems beyond their reach, despite the fact that they live a stone's throw from Yale, ten minutes from UNH, and an easy drive to other universities and colleges in the state. Surrounded by institutions of higher learning but closed out by circumstances, these are the students that New Haven Promise has made its mission to help, summed up in their theme line, "Making the Promise of College and Career a Reality."

Jordy Padilla, who graduated from UNH last May, started living that reality in 2011 when he received a Promise Scholarship and chose the University of New Haven to pursue his dream of becoming a civil engineer. Padilla, an undocumented alien who arrived in the U.S. from Ecuador when he was seven years old, was able to further pursue that dream, thanks to President Obama's landmark "deferred action" allowance — a two-year safeguard against deportation that allowed undocumented immigrants to get temporary work permits under certain restrictions. This allowed Padilla to land the college internships that are so essential to a future engineer's training.

Today, Padilla is a civil engineer for the contractor Walsh Construction, but New Haven Promise is still very much a part of his life. Last August, the

organization awarded him its Legacy Award. The award, which was established in 2014, recognizes a scholar who has recently graduated and has demonstrated a deep commitment to their studies, to their fellow Promise Scholars, and to the City of New Haven. Padilla has done just that, volunteering his time to help high school students prepare for college and navigate the college admission process.

Although Padilla's eyes are firmly fixed on the future at Walsh, he doesn't forget to look back — to the students who are a few years behind him, many of them immigrants like himself who are daring to dream dreams that used to seem like the unreachable star. That's their legacy from Padilla and students like him — generous in turn because of those who were so generous to them.

*Promise Scholarships are funded by Yale University.

University *of* New Haven

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COLLEGE OF ENGINEERING**

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The Tagliatela College of Engineering has
been ranked in the top-tier of undergraduate
engineering programs nationwide by
U.S. NEWS & WORLD REPORT.

SAVE THE DATES!

► The University of New Haven's Innovation Gala — the **33rd Annual Alumni Scholarship Ball** — is on **Saturday, April 16, 2016**. Contact us at **alumni@newhaven.edu** to make sure you're on the invitation list!

► **The TCoE's Senior Design Expo** takes place on **Tuesday, May 3, 2016**. See how innovative our seniors have been this past year as they excitedly explain their projects.
The place: Beckerman Recreation Center.
The time: 10 a.m. to 12:30 p.m.

► Come to UNH and meet **world-renowned cyber security expert Professor Eugene Spafford** of Purdue University on **Monday, April 25**.
Space is limited. RSVP to **phackenjos@newhaven.edu**.