Clean, Sustainable Energy
Harnessing Power from Wind, Sun, Atoms, Biofuels
Dear Alumni, Colleagues and Friends,

It was invigorating to see so much potential when I looked into the seats during our New Student Convocation, which kicked off the 2015–16 academic year. Of the 2,800 freshmen and transfer students in attendance, nearly 30 percent of them were engineering majors—a testament to the ever-growing appeal of our field, the prospects for fulfilling careers and the depth of our academic program offerings. Among those offerings, we continue to add to the depth of our talent in “clean energy,” the focus of this issue of Engineering Solutions. As the world continues to search for ways to reduce its reliance on fossil fuels while meeting growing energy demands, UMass Lowell has been hiring faculty members specializing in areas such as nuclear energy, solar energy, wind energy, alternative fuel production and battery technology. And as our research portfolios grow in these important areas, our educational offerings have also continued to grow, with our Energy Engineering programs offering tracks in both renewable energy and nuclear energy. Our students have also started a Solar Energy Association, and recent breakthroughs in the development of biofuels, by Asst. Prof. Juan Pablo Trelles, the growth of our nuclear engineering program, and participation annually in the Collegiate Wind Competition sponsored by the U.S. Department of Energy taking fourth place this year.

Among the recent highlights in our clean-energy portfolio was the formation of WindSTAR, an Industry/University Cooperative Research Center supported by the National Science Foundation. WindSTAR is one of 64 such centers in the country, but the only one devoted to wind energy research and making the cost of wind power more affordable. The center draws upon the college’s strengths in composite materials and structural health monitoring, among other talents. Prof. Chris Niezrecki, chair of mechanical engineering, led the proposal effort for WindSTAR and serves as its director. The center’s mission revolves around research, education and outreach.

As noted earlier, our efforts in clean energy are not exclusively directed to wind. This issue of Engineering Solutions also showcases research in solar energy led by Asst. Prof. Juan Pablo Trelles, the growth of our nuclear engineering program, including a successful collaboration with the Czech Republic spearheaded by Assoc. Prof. Sukesh Agraha, and recent breakthroughs in the development of biofuels, which is a collaboration between chemical engineering Asst. Prof. Hsi-Wu Wong and mechanical engineering Asst. Prof. Hunter Mack. We also feature relevant success stories by our students and alumni.

Our efforts in clean, sustainable energy are representative of a number of growth areas in the Francis College of Engineering, which we will continue to feature in this publication. With 12 new faculty members joining the college last year and an additional 10 coming on board this fall, there will be many more stories to share.

As always, please feel free to contact me (Joseph_Hartman@uml.edu; 978-934-2576 or via LinkedIn) if you have a story to share or would like to partner with the College. I look forward to hearing from you.

Sincerely,

Joseph C. Hartman, Ph.D., P.E.
Dean, Francis College of Engineering
University of Massachusetts Lowell

Simone Draper

ON THE COVER
New technologies are constantly being developed to fully harness renewable energy sources such as wind and solar power, which are abundant, widely available and practically limitless. These resources can meet the world’s energy-generating needs while addressing the health and environmental impacts of fossil fuel consumption and contributing to global climate change.

Joseph C. Hartman, Ph.D., P.E.
Dean, Francis College of Engineering
University of Massachusetts Lowell

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Mechanical engineering Asst. Prof. Juan Pablo Trelles loses the sun. The sun’s energy, that is. Trelles and his team are focusing their research mainly on synthesizing sustainable fuels using solar energy and carbon dioxide (CO2)—the primary greenhouse gas—as well as water or methane from natural gas.

“Solar fuels hold the promise to provide an alternative to fossil fuels, while mitigating greenhouse-gas emissions,” says Trelles, who directs the department’s Re-Engineered Energy Laboratory. The lab’s research team includes mechanical engineering doctoral students Sujini Bhatta, S. Mahnaz Modirzadeh, Vyasairi Bhargavireddy and Dassou Nagassou from the Energy Engineering Graduate Program, as well as undergraduate students Shyam Sheth and Kaya Greielsky.

“We use concentrated solar energy to directly decompose CO2 at high rates. Together with water or methane, it can form artificial hydrocarbons as fuel,” explains Trelles. “Alternatively, we can use solar energy to break down water or methane to create hydrogen as clean fuel. Developing the technology to produce solar fuels efficiently and cost-effectively has become the goal of several research groups worldwide, including our lab. One advantage of our process is that it could treat CO2 directly as emitted from power plant exhaust, which makes it potentially more economically viable than other approaches.”

The team is also investigating the direct use of electricity in the form of plasma—so-called gas that conducts electricity, as found inside fluorescent or neon lamps, in lightning or in the sun’s corona—for producing sustainable fuels.

“By using electricity from renewable energy sources such as solar, wind, wave and geothermal to create the plasma, we can mitigate the problems associated with interruptions in solar irradiation due to Earth’s daylight cycles and the weather,” notes Trelles. “This means we can run the process continuously 24 hours a day, reducing complexity and operational costs and, hence, increasing economic feasibility.”

Trelles was recently awarded a three-year, $150,000 grant by the National Science Foundation to create a comprehensive formulation for the computational modeling and simulation of turbulent plasma flows, which are found in a diverse range of energy-related applications, from fuel reforming to gasification and waste-to-energy systems. He and his team are collaborating with researchers from the Academy of Sciences of the Czech Republic.

The group has also started exploring the use of concentrated solar energy and electrical plasma for converting organic materials (biomass) and industrial or household waste into fuels.

“We are also looking into sustainable chemical synthesis beyond fuels in order to generate high-value products, such as complex molecules and carbon-based nano-products, out of low-value feedstocks, or raw materials,” says Trelles.

Harnessing the Power of the Sun

The goal is to create ‘solar fuels’ as alternative energy source

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Wind power is a clean and sustainable alternative to fossil fuels. It is plentiful, renewable, widely distributed and does not emit greenhouse gases during operation. Presently, the United States obtains more than 4.5 percent of its electricity from wind energy, says Prof. Christopher Niezrecki, chair of the Department of Mechanical Engineering. The U.S. Department of Energy has shown that it is entirely possible to double that amount by 2020 and to achieve 20 percent of the nation’s electricity from wind.

An important asset to helping achieve this goal is a new, one-of-a-kind national wind energy research consortium headed by UMass Lowell that recently received seed funding from the National Science Foundation (NSF). Called the NSF Industry-University Cooperative Research Center (I/UCRC) for Wind Energy, Science, Technology and Research, or WindSTAR, the center aims to foster long-term collaborations among industry, academia and government.

"With this award from the NSF, UMass Lowell has become the definitive leader for wind energy research here in the Commonwealth of Massachusetts and has established a national reputation for excellence in the field of wind power," says Niezrecki, who is the center director. "WindSTAR is one of 64 industry/university cooperative research centers supported by the NSF, and the only one devoted to wind energy.

WindSTAR’s research efforts will be led by the university’s Center for Wind Energy. In partnership with the University of Texas at Dallas, Other collaborators include Iowa State University, Southern Maine Community College, the Maine Wind Industry Initiative and the KidWind Project.

The center will train undergraduate and graduate students who will support and eventually spearhead the design, manufacture, operation and maintenance of wind-energy systems. WindSTAR will provide a forum in which wind-turbine manufacturers, component and equipment suppliers, service companies and project developers can work together to solve problems that are of mutual concern. It will also integrate engineering with fundamental research to help make wind-turbine systems more reliable and less expensive to operate.

WindSTAR’s member companies currently include Bachmann Electric, EDF Renewables, General Electric, Huntsman, Infinen Energy, Massachusetts Clean Energy Center, National Instruments, NRG Renew, Pattern Energy and TPI Composites. The center and its partners will focus on key areas such as composite blade manufacturing, foundations, towers and infrastructure; structural health monitoring and non-destructive inspection and testing; wind-farm modeling and measurement using lidar; control systems for wind turbines and farms and energy storage and grid integration.

"Wind turbines in the United States are expected to grow in number up to 170,000 by 2030, and this creates a need to replace and dispose up to 34,000 blades per year in the country, and up to five times as much worldwide," notes Niezrecki.

The blades, which are made of fiberglass and other composite materials, can span up to nearly 300 feet in length. “The challenge is that, as the blades get bigger and longer, the likelihood of having structural defects or failures increases,” he explains. “The blades’ lifetime is supposed to be 20 years; for a variety of reasons, right now they don’t last that long.”

In 2012, a multi-disciplinary team of researchers from UMass Lowell and Wichita State University was awarded nearly $1.9 million by the NSF to create the next generation of wind-turbine blades. The team, led by Niezrecki and Profs. Emmanuelle Reynaud, Daniel Schmidt, James Sherwood, Peter Autibille, Robert Malloy, Stephen Penneil and David Turcotte, is developing new sustainable, bio-derived materials to replace existing petroleum-based epoxy resins used in blade manufacturing.

In September 2015, Profs. Murat Inalpolat, Niezrecki and David Wills received another grant from the NSF for $350,000 to develop new structural health-monitoring techniques for wind-turbine blades."

"W indSTAR’s collaborative structure offers companies the opportunity to leverage world-class facilities and expertise, significant resources and funding for cooperative research projects. New industrial members are encouraged to find out more about the center and to be part of these important new research initiatives. For more information, visit www.uml.edu/WindSTAR."
Preparing Tomorrow’s Workforce in the Nuclear Industry

Intercontinental Program Gives Young Scientists Unique Hands-on Experience

Intercontinental Program Gives Young Scientists Unique Hands-on Experience

With the nuclear industry experiencing a resurgence as new reactors for power generation are being built around the world and many more are applying for licenses, the global need for a highly trained and qualified workforce to run the reactors, maintain them and keep them safe is now greater than ever.

To address this issue, the U.S.-Czech Civil Nuclear Cooperation Centre (CNCC) in Prague recently joined forces with UMass Lowell to establish a joint initiative called the Intercontinental Nuclear Institute, or INI, with support from the International Atomic Energy Agency (IAEA). The goal of the institute is to create a well-informed workforce capable of contributing to the long-term sustainability of nuclear power programs around the world.

This year’s INI was co-directed by nuclear engineering Prof. Sukesh Aghara of UMass Lowell and Prof. Radek Škoda of the Czech Technical University in Prague.

The institute’s training program provides young nuclear engineers, scientists and graduate students from across Europe with the tools they need to meet challenges facing the profession. The fellows spent four weeks engaged in classroom lectures, peer-learning and hands-on experience; mentoring by leading experts from industry, academia and R&D organizations; opportunities to conduct reactor experiments and technical tours of nuclear installations in the Czech Republic and the United States.

Through a competitive process, 23 fellows from 14 countries were selected for this summer’s inaugural program, including Kazakhstan, Ukraine, Slovenia, Bulgaria, Romania and Turkey.

“The INI pilot program draws on the expertise and resources from both institutions and countries,” says Aghara, who also directs UMass Lowell’s Integrated Nuclear Security and Safeguards Laboratory. “It brought together the best experience, technology, culture and education from European and American teams to train the workforce of the future.”

“The fellowship provided us not only with an overview of an advanced technological field—nuclear energy—but also a unique experience of working together at the international level, an asset for my future professional development,” says Julia Bartos, a recent graduate of the Budapest University of Technology and Economics in Hungary.

A total of five UMass Lowell students were involved during the American portion of the INI program. “As an undergraduate studying nuclear engineering, meeting the INI fellows from different European countries and hearing about their experiences in the nuclear industry was extremely interesting and eye opening,” says Jacqueline Noel, who participated in the technical program on campus and helped the university’s team host the foreign guests.

BILATERAL COLLABORATION ACROSS THE ATLANTIC

This summer’s INI training session was split between the CNCC and UMass Lowell, with the Czech center hosting the participants at Chateau Stříbří near Prague for the first two weeks. UMass Lowell hosted the attendees on campus for the last two.

“The INI curriculum is designed to broaden the fellows’ knowledge base in order to prepare them for the future needs of the industry,” says Aghara. Among the topics covered were reactor fundamentals and design features; the economics, planning, licensing, operations, engineering and management of nuclear power plants; nonproliferation and nuclear safety, security and safeguards; advanced reactor design; fuel cycle management; radiation detection and measurement and physical protection.

The program also featured visits to the Czech Republic’s two commercial nuclear power plants and three research reactors. At UMass Lowell, the fellows gained first-hand experience in nuclear engineering and radiological health physics with the university’s 1-megawatt (MW) research reactor and the Radiation Lab. They also had an opportunity to tour nuclear facilities in New England, including the Seabrook and Pilgrim nuclear power plants, the Massachusetts Green High-Performance Computing Center, the Belfer Center at Harvard University and the 6-MW research reactor at MIT, as well as the headquarters of leading nuclear engineering companies like CB&I, Canberra and ISO New England.

“The first batch of INI graduates now have a comprehensive understanding of the workings of nuclear power plants, as well as the knowledge and skills to become future industry leaders,” says Aghara.

The IAEA plans to offer the INI fellowship again in 2016. For more information about the program, visit www.intercontinental-nuclear-institute.com.
Since fossil fuels are a finite resource, it is imperative that we identify alternative renewable fuel sources,” says Mack. “First-generation biofuels the environment while remaining clean and sustainable.”

Assist. Profs. Hsi-Wu Wong and Hunter Mack examine the reactor used in the breakdown of the mix into biofuel, which then collects in the steel cylinder. A glass tube is heated without oxygen in a furnace to 500° Celsius to pyrolize producing biofuels in the lab. In the setup, a sample of biomass-waste mixtures, synthesizing high-value commodity products from biomass-derived feedstocks (raw materials) and generating energy from the co-processing of fossil fuels like coal and shale gas with biomass. Mack is currently working with graduate student Marta Shahsavan and is collaborating with researchers at the University of California at Berkeley, the National Renewable Energy Laboratory, the Lawrence Livermore National Laboratory and the Colorado School of Mines.

DISCOVERING NEW REACTION PATHWAYS

Wong’s research, meanwhile, focuses on the recycling of solid wastes, which he says is “one of the most critical environmental issues today.”

“Discoveries of new chemical reaction pathways, or processes, to convert wastes into alternative fuels and green chemicals will enable new technologies to manufacture next-generation renewable and sustainable fuels and products,” he says.

Wong’s group include producing biofuels from plastics and biomass-waste mixtures, synthesizing high-value commodity products from biomass-derived feedstocks (raw materials) and generating energy from the co-processing of fossil fuels like coal and shale gas with biomass. Assisting Wong in the lab are Ph.D. students Melisa Nallar and Peng Yu and master’s student Wibor Zuo. Wong is also collaborating with researchers at MIT, the University of California at Santa Cruz, NASA and Aerodyne Research, Inc.

“Converting waste to energy and/or products is particularly promising, since we are cutting down waste and producing renewable energy or high-value chemicals at the same time,” he says.

B iology—liquid fuels such as ethanol and biodiesel derived from organic materials (biomass) or their waste products—can supply our energy needs in transportation and electricity generation while significantly reducing the emission of planet-warming gases. Among the scores of researchers worldwide who are developing new processes to make biofuels and evaluate their performance are U.S. Army Research Laboratory mechanical engineering Assist. Prof. Hunter Mack and chemical engineering Assist. Prof. Hsi-Wu Wong.

“Since fossil fuels are a finite resource, it is imperative that we identify alternative renewable fuel sources,” says Mack. “First-generation biofuels the environment while remaining clean and sustainable.”

Preliminary research has shown that by using noble gases such as argon, xenon or krypton as the working fluid in gas turbines, we can increase the turbines’ thermal efficiency by more than 25 percent,” he explains. “For domestic turbine power plants fueled by natural gas, this efficiency translates to a reduction in the amount of natural gas burned by 13.5 billion cubic feet, resulting in 1.5 billion pounds less carbon dioxide emissions.”

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A LOW-COST ALTERNATIVE

Grigov says even today’s electric cars are not completely free of pollution.

“Even today’s electric cars are not completely free of pollution. The electricity used to recharge their batteries is derived from alternative energy sources and is usually more expensive than the cost of fuel,” Grigov says. “Our team is developing a low-cost alternative to fossil fuels.”

The group is developing a low-cost alternative to fossil fuels. This also means that it generates its equivalent of more than six times the amount of pollution if charged from the grid. On the other hand, a solar-electric taxi is charged completely using the solar panel, then there is no pollution produced. Lager adds: “In the United States, the average cost of residential electricity is 12 cents per kilowatt-hour. This means the Leaf costs 9.6 cents per mile to recharge at home. By comparison, charging the solar-electric taxi from the grid costs 0.5 cent per mile and, if charged completely using the solar panel, there is no cost at all.”

Grigov says this is largely due to the fact that the taxi was designed to mimic a bicycle rather than a car.

“It has much less torque and speed than the Leaf, but offers less air resistance and a much lighter frame,” he says.

A team of electrical and computer engineering students led by sophomore Alexander Grigov has designed, built and tested a prototype solar-electric powered quadricycle, or taxi, that could carry up to four passengers at speeds reaching 25 miles per hour without consuming a single drop of gas.

“This vehicle has the potential to replace both commercial taxis and personal cars,” says Grigov. “It’s cleaner, more sustainable way to commute.”

The students’ taxi uses a 150-watt solar panel to charge a 20 ampere-hour battery, which in turn runs the taxi’s DC motor. “It can travel more than 20 miles on a full charge, making it ideal for commuting around campus and in crowded cities as well as transporting people in hotels, resorts, golf courses and between hospital wings,” says Grigov.

In addition to Grigov, other members of the team include Christopher Leger, Jared Mervs and Oliver Kayego. The group received funding from the city of Astana for their project.

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Students Create a Solar-Electric Taxi

Invention Is a Sustainable and Pollution-Free Way to Move People

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NEXT STOP: KAZAKHSTAN

The government of Kazakhstan has expressed interest in applying the technology in its own country, according to electrical and computer engineering Prof. Samson Mil'shtein, director of the university’s Advanced Electronic Technology Center and the students’ faculty adviser.

In 2014, Mil’shtein was invited to talk about the university’s solar cell research at a world economic forum held in Kazakhstan’s capital city of Astana. During the meeting, Nurlan Sultanovich (Bekbulkyanov, chairman of the board of the JSC Kazakh Academy of Natural Sciences “Parasat”), asked the professor if the students can develop a similar solar-electric taxi for exhibition at the Astana Future Energy Expo in 2017. The government provided a seed grant of $27,000 to develop the prototype.

"Our students are designing an improved version of the taxi right now and we are preparing to submit a grant proposal to the Academy to fund the project," says Mil’shtein. "We are also working on commercializing this technology in the near future."
A Rising Star in Renewable Energy Engineering
Alumna Designs and Develops Sustainable Energy Projects

In 2014, Maria Mercedes Pereyra Boue ‘15 toured the photovoltaic lab of BTU International, a global supplier of thermal processing equipment based in Billerica, Mass., as part of a class field trip. In 2014, Maria Mercedes Pereyra Boue ’15 toured the photovoltaic lab of BTU International, a global supplier of thermal processing equipment based in Billerica, Mass., as part of a class field trip.

“M y role was to study the direct solar photo-
thermochemical reaction of CO₂ to hydrogen and oxygen in a reactor and develop a kinetic model of those chemical interactions,” explains Pereyra Boue. “Although much work still needs to be done to make solar fuels readily and easily available, research into solar photo-thermal processes has been marked by rapid progress in recent years.”

A RECORD OF ACADEMIC ACHIEVEMENTS

Pereyra Boue hails from Buenos Aires, Argentina, where she studied to become a chemical engineer. She worked as a teaching and research assistant at her alma mater, the Universidad Tecnológica Nacional, served as technical adviser to the country’s National Congress and interned at Tomás Batu University in Zlin, Czech Republic. She also worked for large global companies like Shell and Siemens.

In 2013, Pereyra Boue accepted a Fulbright scholar- ship to attend Umass Lowell. This past spring, she was awarded a master’s degree in energy engineering, with an option in renewable (solar) engineering from MIT. Among the numerous honors she has received from the university are the 2015 Dean’s Gold Medal for Energy Engineering, the Provost’s graduate fellowship for 2013–2015 and the Graduate Student of the Year Award for 2014–2015.

Pereyra Boue currently works as an international applications engineer at Imergy, a leading manufacturer of grid-connected photovoltaic inverters in Lawrence, Mass., where she assists clients, investors and private solar field owners in incorporating the company’s products into their solar projects in Latin America and Asia.

“Umass Lowell is a great school, providing me with multiple opportunities for intellectual improvement and growth. It’s so full of life,” she says.

In 2015, Pereyra Boue represented the university at the U.S. Department of Energy’s Challenge Home Student Design Competition in Golden, Colo., which she described as a “unique experience.” She also revitalized the university’s Solar Energy Association after a long hiatus.

“This organization allowed students to tour industry facilities, develop collaborative projects and organize lectures on renewable energy,” she says. “Personally, the opportunity of being actively involved in student organizations.”

Pereyra Boue credits the strong link between her professors and the Massachusetts solar industry for her success. “I believe this direct interaction with industry—through internships, job offers, lectures by industry leaders and site visits—is what enriched my experience,” she says.

Pereyra Boue adds: “Success is not just about the academic curriculum. I was able to participate in the STRIVEx program, a personal leadership-development initiative being offered by the Office of Student Activities and Leadership. This program gave me the skills to resolve problems and become an effective leader, qualities that have been extremely helpful in my professional career. I can say through my own experience that Umass Lowell’s slogan of graduating ‘work-ready’ students definitely lives up to that expectation.”
Kokkinos, who was born on the small island of Zakynthos in the Ionian Sea in western Greece, came to the United States in 1970 to attend what was then called the Lowell Technological Institute. After earning a bachelor’s degree in chemical engineering in 1974, he pursued graduate studies, receiving a master’s degree in fuel science (materials science) from the Pennsylvania State University in 1977.

Since then Kokkinos has worked for the major suppliers of equipment used to generate electricity and control air pollution produced by burning fossil fuels, primarily coal. During his career spanning nearly four decades, he has written and presented more than 50 papers on fuel combustion, emissions controls, concentrating solar power and steam-generator design and has received five U.S. patents.

For the past nine years, he has been working for Babcock Power, a 1,300-employee, privately held corporation headquartered in Lynnfield, Mass., with offices and plants in the Commonwealth of Massachusetts and elsewhere. Babcock Power provides equipment and services to industrial and utility power-generation clients around the world.

“As chief technology officer in our Lynnfield corporate office, my primary job is to help management in developing new strategic technologies and provide technical assistance to our operating divisions in areas of my expertise, focusing on energy efficiency and minimizing harmful emissions,” explains Kokkinos. “In the electric-power-generation industry, fuel represents more than 65 percent of total cost of generation and, as such, even small improvements in the overall efficiency of the process can make a big difference in operating costs, eventually resulting in lower electricity rates for all of us.”

During his tenure as vice president of engineering at Babcock’s Riley Power division, Kokkinos was involved in the design of the largest concentrated solar power steam generator in the world, the Ivanpah Solar Electric Generating System project in the Mojave Desert in California (see the photo on the facing page). Riley designed and manufactured the three 2,200-ton boilers mounted on top of tall towers that supply steam to produce a total of 377 megawatts (million watts) of electricity.

“This output is enough power to provide the yearly electricity needs for approximately 140,000 homes,” he says. “At that time, we also designed and provided steam generators for producing 50 megawatts of electricity using municipal waste—otherwise known as household garbage—as well as steam generators that use biomass such as waste wood, corn husks, bark, etc.”

He says the company’s Vogt Power division, based in Louisville, Ky., is a pioneer in supplying heat-recovery steam generators to more than 250 power plants around the world. The generators recover energy from the hot, combustion exhaust gases that would otherwise go to waste, and use it to produce steam to turn turbine generators.

“This combined cycle is the most efficient way of producing electricity in the world, with cycle efficiencies well over 50 percent,” he notes. “As a result, when low-carbon fuels such as natural gas are used, it produces the lowest carbon dioxide emission—at nearly half that of burning coal.”

A WELL-ROUNDED EDUCATION

“The education that I received at Lowell Tech provided me the solid foundation I need to be a competent and productive engineer, at a very reasonable cost,” Kokkinos says. “The willingness and availability of my professors to help and work with me beyond the classroom have prepared me well for my chosen profession.”

He adds: “As a foreign student, my educational experience at Lowell Tech was wonderful and was well-rounded in academics and extracurricular activities. I was surprised by how friendly and down-to-earth our professors were and by the unconditional help of my fellow classmates, especially when it came to mastering the English language. Extracurricular activities, such as playing varsity soccer and being in the track-and-field team helped assimilate me even more to the school community and made me feel at home. Our team travels also introduced me to the beautiful vistas of New England, which I would not have experienced otherwise.”

Kokkinos and his wife, Susan, currently live in Ayer. They have two children, who are both engineers.

“We are big supporters of Penn State football and, of course, the UMass Lowell River Hawks, having been season ticket holders for the hockey games since we came back to the Lowell area in 2006,” he says. “You will probably see me and my wife at every home game in the front row, next to the student section. It makes us feel young, and the students are as entertaining as the game. We also enjoy and support the River Hawk Pep Band, which we think is the best-darn pep band in the land. We were thrilled last year that UMass Lowell finally has a fight song!”

Angelos Kokkinos ’74
New Faculty

Ertan Ag, Ph.D., has been appointed assistant professor of mechanical engineering. He earned his doctorate from Drexel University and was previously a postdoctoral scholar at Texas A&M University.

John Christian, Ph.D., has been appointed professor of civil and environmental engineering. He obtained his doctorate from MIT and was previously a visiting professor at UMass Lowell.

Joyita Dutta, Ph.D., has been appointed assistant professor of electrical and computer engineering. She received her doctorate from the University of Southern California and was recently a research fellow at Harvard and the Massachusetts General Hospital.

Raj Gondle, Ph.D., has been appointed visiting lecturer in civil and environmental engineering. He earned his doctorate from Texas A&M University and was previously a postdoctoral fellow at that university.

Zhu Miao, Ph.D., has been appointed assistant professor of mechanical engineering. He obtained his doctorate from the University of California, San Diego, where he was recently a postdoctoral scholar.

Slavah Pakdelian, Ph.D., has been appointed assistant professor of electrical and computer engineering. He received his doctorate from Texas A&M University and was previously at the University of Illinois at Chicago.

Shereb Pangsuyong, Ph.D., has been appointed assistant professor of electrical and computer engineering. She earned her doctorate from the University of Virginia and was previously at the University of Arizona.

Alfred Paradis, Ph.D., has been appointed visiting lecturer of electronic engineering technology. He obtained his doctorate from MIT and had previously worked for Mitre.

Scott Stapleton, Ph.D., has been appointed assistant professor of mechanical engineering. He received his doctorate from the University of Michigan and was previously a postdoctoral researcher at the Technical University of Munich.

Jianxin Tang, Ph.D., has been appointed lecturer in electrical and computer engineering. He received his doctorate from the ASCE of Connecticut and was previously at Alfred University.

New Research Awards

The University of Illinois at Chicago, Development and Engineering Center has increased its cooperative agreement with UMass Lowell through a number of new projects, including the following:

- "DNA test method for fabric resistance to very low force penetrators" led by Prof. James Sherwood, mechanical engineering.
- "Multimodal energy absorption for helmet low-velocity impact protection" (Sherwood and Asst. Prof. Nese Orbey, chemical engineering).
- "Thickfilm capacitive polymer for the detection of explosives and chemical warfare agents" (Assoc. Prof. Ramaseswamy Naragaran, plastics engineering).
- "Conductive ink printing on fabric" (Naragaran and Edward Kingsley, technical program manager, HEROES initiative).
- "Parachute suspension line load architecture and the resulting fluid-structure interaction" (Sherwood and Assoc. Prof. David Williford, mechanical engineering).
- "Shell life quantification and analysis of orthotropic fabric patches: morphologic approach" (Naragaran and Assoc. Prof. Alireza Mehdizadeh, electrical and computer engineering).
- "Advanced fiber reinforced metal matrix composites for structural applications" (Prof. Christopher Hansen, mechanical engineering).
- "Automated manufacturing of damage-tolerant, self-healing organic ceramic pressure vessels." (Dutta was awarded a grant by the National Sanitation Foundation (NSF) for the project, "Stochastic and bifurcation analysis of composite nonlinear piezoelectric micro-structures.")

- Assoc. Prof. Hengyong Yang (electrical and computer engineering) has been awarded a grant by the NIH for the project, "Tensor-based dictionary learning for imaging biomarkers."
- Assoc. Prof. Dean Wang (nuclear engineering) has been awarded a grant by the U.S. Department of Energy in order to conduct a feasibility study for providing a new and efficient way of nuclear waste disposal.
- Assoc. Prof. Pradeep Kurup (electrical and computer engineering) received a National Science Foundation grant for the project, "EAGER: Novel memory design with ballistic transport.
- Assoc. Prof. Fan Gao (chemical engineering) has been awarded a grant by the NIH for the project, "Acoustically-induced structural health monitoring of clothe materials and its application to wind turbine blades."
- Assoc. Prof. Martin Margala (chemistry and computer science) has been awarded a grant by NSF for the project, "EAGER: New memory design with ballistic transport.
- Assoc. Prof. Margaret Sobkowicz-Kline (electrical and computer engineering) has been awarded an NSF grant for the project, "Multiscale composite 3D printing."
- Sherwood, Assoc. Prof. Qingwei Wang (electrical and computer engineering), and Prof. Marc Mead (electrical and computer engineering) have been awarded an NSF grant for the project, "EAGER: Novel memory design with ballistic transport."
- Assoc. Prof. Margaret Sobkowicz-Kline (electrical and computer engineering) has been awarded a grant by the NSF for the project, "EAGER: A new precursor for carbon fiber manufacturing."
- Assoc. Prof. Pradeep Kurup (electrical and computer engineering) has been awarded a grant by the NSF for the project, "EAGER: A new precursor for carbon fiber manufacturing."
- Assoc. Prof. Fan Gao (chemical engineering) has been awarded a grant by the NIH for the project, "Acoustically-induced structural health monitoring of clothe materials and its application to wind turbine blades."
- Assoc. Prof. Martin Margala (chemistry and computer science) has been awarded a grant by NSF for the project, "EAGER: New memory design with ballistic transport."
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