

# UB BREAKTHROUGHS

THE UNIVERSITY OF BRIDGEPORT RESEARCH REVIEW

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**UNIVERSITY OF  
BRIDGEPORT**

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## From the Senior Vice President

Dear Colleagues,

I am pleased to present this 2016 edition of "Breakthroughs," the University of Bridgeport's research review, published by UB's Division of Graduate Studies and Research, to showcase the research conducted by our faculty, often with the involvement of outstanding students.

As we at UB prepare to celebrate our 90th anniversary in 2017, I am particularly proud of this most recent decade, which is marked by robust growth in our research enterprise. Our faculty's scholarship and research play two important roles: they advance the body of knowledge in their particular disciplines and they engage our students as the next generation of scholar-researchers. The variety of topics covered in these feature articles reflects UB's diverse program offerings and demonstrates the intellectual capital of our faculty. Breakthroughs have also been made in particular areas, as you will see in this issue's articles.

I hope that you will enjoy this third issue of Breakthroughs and that it will provide you with a glimpse of some of the innovative and interdisciplinary research being conducted by UB faculty and students.



Tarek M. Sobh, Ph.D., P.E.  
Senior Vice President for Graduate  
Studies and Research  
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## FEATURES

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## Smartphones and Skin Cancer Detection

A NEW APP IN THE HANDS OF SAVVY CONSUMERS COULD BE THE LATEST TOOL FOR SKIN CANCER DETECTION

by Constance Vickers

For the past thirty years, the incidence rates for melanoma, the deadliest form of skin cancer, have continued to increase in the United States. Even though mid-century practices of tanning oils and foil mirrors have dwindled and skin cancer awareness campaigns have been stepped up, many millennials still flock to tanning salons in order to maintain a glow all year round. Sadly, the continued exposure to ultraviolet (UV) rays has led to higher risks of melanoma, especially in females under forty. This type of cancer, which develops in cells that produce melanin (the pigment that gives our skin its color) can develop anywhere on the body, although it is most commonly found on areas prone to sun exposure including the back, legs, arms, and face. One in five Americans will be diagnosed with skin cancer in their lifetime, and on average one American dies from skin cancer every hour.

A few years ago, Miad Faezipour, Ph.D., assistant professor of computer science and engineering and

biomedical engineering, and Buket Barkana, Ph.D., associate professor of electrical engineering, joined forces with then-Computer Science and Engineering doctoral student Omar Abuzagheh to begin development of a novel, smartphone-based virtual reality system to aid in melanoma detection and prevention. Their application, SKINcure, focuses on the analysis of suspicious moles and lesions and on prevention notification. In a growing technological world, they understand that a convenient and user-friendly application is likely to become an important tool in the prevention and screening of this most deadly form of skin cancer.

Through the SKINcure application system, the user is able to analyze suspicious moles and lesions by snapping a smartphone photo and uploading to the application. For better results, the SKINcure app is aided by a handy-scope camera which easily attaches to the iPhone's camera lens. This allows for a higher quality image to be captured and

analyzed by the SKINcure application system. Then, the photo of the mole in question is compared to PH2 dermoscopic images in a comprehensive database. The database images have been obtained under the same 20x magnification conditions as the images captured through the SKINcure application. The image database contains 200 dermoscopic images of lesions, including 80 normal moles, 80 atypical moles, and 40 melanomas. The diversity of the images in the database allows for a better analysis of the images collected from the user. SKINcure then analyzes the mole using the dermoscopic image database and classifies it as either "normal," "atypical," or "melanoma." If the mole is classified as atypical or melanoma, the user is notified to seek medical help immediately in order to increase the chances of successful treatment options.

In addition, the system is able to capture user environmental data, UV radiation level and skin images to conduct a risk assessment and alert the user in real-time to prevent risks associated with developing skin cancer. SKINcure detects sunlight from the user environment using the smart phone GPS system and handy-scope camera. By mapping the user location and the time of day, an accurate ultraviolet radiation level can be calculated. At the time of initial registration, the user will be asked to select a burn frequency that best describes his or her skin: "rarely," "sometimes," "usually," or "always." After the data is captured through the application it will alert the user in real-time when the user encounters exposure to high UV radiation and over sun exposure, allowing the user to reapply sunscreen, seek shade, and use other methods of prevention. The outcome of the research platform is intended to help users prevent skin cancer by triggering the real-time alert that informs users when to avoid exposure to harmful UV radiation and to help with early detection of melanoma in order to increase the chances of successful treatment options.

Faezipour joined the engineering faculty in July of 2011 and has quickly established a solid research focus through receiving a number of institutional Seed Money Grants. Her research interests lie in the broad area of biomedical signal processing and behavior analysis techniques, high-speed packet processing architectures, and digital/embedded systems.

Barkana joined the engineering faculty in 2007 in the department of electrical engineering. This research project was funded through a Seed Money Grant awarded by the Faculty Research Council. Her research interests include all aspects of signal processing including speech, non-speech, and bio-signals, biomedical image processing, and innovations in K-12 STEM education. She is the author of over sixty published journal and conference articles.

Abuzagheh graduated with his Ph.D. in Computer Science and Engineering in May 2015 and is employed by the UB School of Engineering as adjunct faculty and assistant lab manager. In April 2016, Abuzagheh was the recipient of a UB Faculty Research Day Faculty Award for his dissertation research to develop SKINcure, which has already received a provisional patent.

The research was funded in part by a Seed Money Grant from the University of Bridgeport. ■





## Heavy Metal Toxicity and Cancer }

**TOXICOLOGIST SPIRIDON KATSIFIS RESEARCHES THE MUTAGENIC AND CARCINOGENIC EFFECTS OF HEAVY METALS**

by Christine Hempowicz

Chronic disease. Cancer. Diagnoses that trigger racing thoughts and questions. What? How? Why? Those visceral reactions fuel the demand for an annual investment of billions of dollars to scientific research by federal and state agencies as well as numerous non-profit foundations and individual contributions. The National Institutes of Health's National Cancer Institute has a budget of close to \$5 billion per year, with much of it spent on research.

The identification of cause, the quest for effective treatments, and the search for prevention each drive the focus of research. For example, researchers already know that exposure to certain environmental chemicals, including heavy metals, can contribute to disease and death. To complicate matters, heavy metals are elements naturally found in the environment. Plus, heavy metals are widespread environmental contaminants, with certain occupations experiencing prolonged exposure. In response, the Environmental Protection Agency,

Federal Drug Administration, and Occupational Safety and Health Administration Protections provide training, monitoring and regulatory oversight for public safety. Add to that the non-profit sector and industry responses such as the growing organic foods movement and natural detox programs and you get the picture—we don't want to be exposed to contaminants that threaten our health and wellbeing, especially since science has yet to put all the puzzle pieces into place.

Two heavy metals, Nickel (II) and Chromium (VI), are known carcinogens that we come in contact with on a daily basis. Their alloys are found in cell phones and stainless steel, as well as in orthodontic appliances and e-cigarettes, and they are found in general environmental pollution. Workers in certain industries such as chemical and alloy production, leather tanning, metal plating, and welding experience prolonged exposure to higher levels of these heavy metals. In fact, the mutagenic and carcinogenic effects of heavy metal exposure

are well documented in epidemiological studies.

A mutagen is any agent that causes an alteration in a cell's DNA sequence. The alteration may not produce measurable effects, plus, mutations can occur spontaneously, in the absence of a foreign agent. All mutagens are genotoxic, i.e., they damage the cell's genetic make-up. A carcinogen can be a mutagen whose effect on the DNA sequence might result in cancer, i.e., the creation and uncontrolled multiplication-metastasis of abnormal cells.

One central focus of research among toxicologists is to identify the actual mechanism of action for the mutagenic and carcinogenic effects of heavy metals. To be sure, DNA sequences do periodically mutate spontaneously without perceptible effects. But mutations that are caused by external influences such as heavy metals, UV lights, or x-rays, or some combination can result in a higher mutation rate, leading to chronic disease and cancer. Spiridon Katsifis, Ph.D., professor of biology at UB, set out to determine whether or not Nickel (II) and Chromium (VI), as mutagens-carcinogens, interact with each other in ways that affect their DNA damaging effects. Katsifis explains that because we are exposed to complex physical- chemical mixtures in very low doses, it can take more than a decade for adverse effects to be detected. Plus, for some, this process is compounded by a genetic predisposition.

Katsifis, who received his Ph.D. in Systemic-Molecular Toxicology/Environmental Oncology, from New York University's Institute of Environmental Medicine and is a member of the Society of Toxicology, was interested in identifying the process, i.e., determining the actual mechanism of action for the effects of these heavy metals, and to investigating if nickel antagonizes the genotoxicity (DNA damage) of chromium. Further, he set out to confirm the premise that exposure to low doses of the heavy metals actually induces "protective effects" in the cell against higher, toxic doses of the same DNA damaging agents.

Commercially produced Chinese Ovary Cells were selected for the in vitro study of DNA damage induced by physical or chemical agents. Chinese Ovary Cells (CHO) are the cell of choice for this type of study and are known as a workhorse in the biotech industry. Katsifis used an experimental method, exposing groups of CHOs to nickel in different concentrations of nickel chloride solutions, to chromium in different concentrations of sodium chromate solutions, and to different concentrations of solutions containing both metals, along with bromodeoxy uridine. The CHOs in these different treatment groups were then harvested, incubated, prepared into slides, and stained, following the differential staining process developed by Hoechst, for optimal viewing of the chromosomal material during division. The ability to stimulate cell

division and then halt the division during a precise part of the process for examination was critical for this type of study. So it was very important to maintain strict research protocol conditions throughout the experiment. Katsifis selected and trained research assistants for this purpose from among his undergraduate biology students.

The results of the study demonstrated an increase in DNA damage in cells exposed to the single-metal solutions, and was dependent on the concentration of the metal. This result was expected since both heavy metals are known carcinogens. However, the cells that were exposed to a solution that contained both nickel and chromium did not demonstrate a higher increase in Sister Chromatid Exchanges (SCEs), a biomarker accurately detecting DNA damage in the cells. Instead, the cells exposed to the mixed-metal solution showed lower levels of SCEs than their single-metal-solution counterparts. So, these two heavy metals appear to interact in ways that decrease their mutagenic-carcinogenic effect (antagonistically). This may prove beneficial, but Katsifis pointed out that this finding is problematic for assays of chemical exposure since they rely on the level of DNA damage. In this case, the lower level of SCE observed cannot be used to conclude that there was no exposure or that there was no DNA damage to an individual who might have been exposed to a complex mixture of physical-chemical agents at home or in the environment in general. Therefore, Katsifis's laboratory is working to elucidate whether the antagonistic interaction observed between nickel and chromium leads to new methods for treating or preventing certain cancers or the SCE biomarker fails to detect every possible mechanism of DNA damage that might lead to cancer. ■





## Alone in the Crowd: } The Pain of Social Exclusion

### PSYCHOLOGY PROFESSOR STUDIES THE EMOTIONAL AND PHYSICAL PAIN EXPERIENCED BY SOME IN SOCIAL SETTINGS

by Debra Kirouac

David Oberleitner, Ph.D., first became interested in studying the effects of social exclusion as an undergraduate student in 2002, just as this social phenomena was beginning to be studied widely. “To me, it is such a ubiquitous experience in so many people’s lives,” states Oberleitner, associate professor of psychology at the University of Bridgeport. “[Being excluded] is a pretty universal experience: when you raise your hand in class and aren’t called on; if you’re ignored in a professional setting; when children are left out of games on the playground.” While still an undergraduate, he heard a pioneer in the field speak to this topic. “It got me excited. I liked it because I am a social psychologist and we study social interaction. Social exclusion is the opposite of that; it is the absence of interaction.”

In 2013, Oberleitner co-authored a research article for the *European Journal of Social Psychology* titled “Upright and Left out: Posture Moderates the Effects of Social Exclusion on Mood and Threats to Basic Needs.” The study was designed to look at possible ways to defeat the negative consequences of being socially excluded. Oberleitner noted, “We wondered if sitting up straight could shield you against the negative effects of being left out, given the boost it gives

to one’s confidence and self-esteem. We found that doing so seemed to intensify the negative effects of exclusion, when being left out of an online game interaction. The temporary boost made it a little higher for the excluded individual to fall. What surprised me and moved me toward social health and exclusion is my interest in the fact that we do not have standardized ways to try and combat the negative effects of social exclusion. People have similar experiences when they’re socially excluded. But as a field, we don’t know how to take the next step.”

Are some people predisposed to feelings of despair when socially excluded because, perhaps as children, they suffered the same fate? Oberleitner says he doesn’t have the answer. “For some, it may become part of the persona they adopt – that of the ‘left-out individual.’ And that can have chronic negative effects. For others, that feeling of being excluded is more fleeting. What that occurs is something the field has struggled to figure out.” There’s also the idea of the “perception” of being excluded: “If someone thinks they’re being left out or isolated – is that more important than truly being left out? This leads to more recent work I’ve been doing via a social health collaboration with researchers at the Yale School of Medicine on how social isolation

and rejection sensitivity interact. Why might some people interpret ambiguous situations as them being left out and ignored, whereas that’s not always the case? But for some reason, they’re more sensitive to those cues. How does this differing perception and exclusion impact people’s overall health? Why are people feeling that way? It’s an important piece.”

When confronted with social exclusion/social isolation, people universally respond with predictable negative patterns of thinking: self-esteem goes down, they experience negative emotions, have a decreased sense of belonging, and feel less in control of their lives. Once excluded – or once people *perceive* exclusion – they also tend to have similar negative behaviors. “People become less helpful and less pro-social to others, which may hurt them in reestablishing social connections,” states Oberleitner. “People may also be more likely to engage in aggressive behavior. Someone who engages in a school shooting—it is a common thread that they had a background of social exclusion. It is a common theme, oftentimes

coupled with mental illness.” One of the classes Oberleitner teaches is Psychology of Stigma. He notes that there are many ways in which someone can feel stigmatized, whether it’s their sexual orientation, age, weight or race. All can contribute to feeling left out. “We see similar consequences regardless of why the exclusion occurred,” he adds.

Professor Oberleitner also highlights the correlation between physical and emotional pain. “The brain reacts the same way with emotional pain as it does with physical pain. There’s a really strong link in how the brain interprets both.” He mentions how this process is being studied. “Some people experiencing emotional pain have been given either a placebo pill or Tylenol. What some research groups have found is that Tylenol helps to also shut down the emotional pain activation. This is part of what led me to collaborate with researchers at the Yale School of Medicine, who are also involved with the study of chronic pain and substance abuse. Can we come up with ways to deal with chronic pain that could also benefit those who’ve been socially excluded?”

Since his findings suggest that social isolation leads to more perceptions of pain, Oberleitner hopes to someday delve further into the connection between social exclusion and substance abuse; i.e., how people might self-medicate as a means of coping with their feelings of isolation. “It might be why some people are more accepting of losing social connections. If they use something like opioids, does that override the natural system of seeking out connections

because their social pain is being blocked? More evidence is needed. This is something that’s really underexplored, given the social ramifications and the ubiquitous nature of being socially excluded.”

One wonders if coping skills should be taught early on, during a child’s formative years, by parents who are all too aware of the devastation that can be heaped upon innocent people via school shootings and other acts of violence. “The literature supports teaching coping skills to children, even if it is not considered a standardized way to treat experience.” If a child feels isolated, his parents or other trusted adults can remind him about other positive experiences in his life, tempering the sting of bullying or social exclusion. Encouraging avenues in which children can experience positivity, e.g. joining a theater group or sports team, may help soften the blow of isolation so it doesn’t become their dominant worldview. For teenagers and pre-teens, the knowledge that they are outsiders is typically heightened. There’s also a reluctance to confide in adults

because the embarrassment can be too much to bear.

The advent of the Internet and the cyber bullying that can sometimes arise is just one more way in which people can feel socially excluded. This technology highlights the divide between the generations, making the old adage “Chin up! Learn to fight back” seem dangerously passé. Parents may have less awareness of the full extent of cyberbullying their child may be experiencing. “Parents don’t always know what ‘Snapchat’ is. It makes it harder if a parent doesn’t realize what’s happening.”

The concept of introducing children to positive avenues of social acceptance may also work for adults experiencing social exclusion. “If I looked at it from a lifespan approach, it would really highlight how common this experience is for most people. You can seek out areas in which you feel included and cared about. If a person is sensitive to a situation they may have perceived incorrectly, we shouldn’t imply that it’s all in their head; rather, we should offer a strategy to minimize the event that’s truly there or help them change their perception of the situation.” Oberleitner says that his overarching goal is to figure out ways to treat a person who feels this social pain acutely with perhaps some of the same methods used to deal with folks suffering from chronic pain. “The key is to bridge the gap. We know the pain systems are similar, but how do we utilize that knowledge to treat the socially wounded?” ■

## Big Data – Big Future }

### COMPUTER SCIENCE FACULTY TACKLE THE CHALLENGE TO TEACH BIG DATA ANALYTICS APPLICATIONS TO THE NEXT GENERATION OF ASPIRING ANALYSTS

by Christine Hempowicz  
and Leslie Geary

In the 1999 sci-fi film, *The Matrix*, you may recall the now-famous “Matrix digital rain,” electronic monitors displaying images of iridescent green symbols on a black background cascading like water droplets down the screen. And while movie viewers couldn’t make sense of these flowing images, the movie’s characters could!

Of course, that is sci-fi and this is the “real world.” But yesterday’s sci-fi may, in fact, be turning into today’s reality, at least where big data analytics is concerned. Jeongkyu Lee, Ph.D., professor of computer science and engineering in UB’s School of Engineering explains that making sense of huge volumes of seemingly random data is what it’s all about in a world overrun by data in all forms, including numbers, images and words.

The key is to be able to make sense of this massive resource-in-the-raw. Whether used for predictions or to identify new opportunities, big data analytics’ applications are far-reaching: in business and industry, public health, science and research, for weather analysis, and in security, cybersecurity and law enforcement, to name a few.

Lee regularly teaches courses in big data analytics at UB and mentors a solid cadre of graduate students in thesis topics under the umbrella of his Multimedia Information Group (MIG). The MIG lab was recently moved to the newly renovated engineering labs in UB’s South Hall, and is commonly filled with graduate students being mentored by Lee and fellow faculty.

At the same time, Lee, who is very active in local community outreach and serves as an advisory chair for the Korean Computer Scientists and Engineers Association of America (KOCSEA), is sought after by parents who want their children to receive important, foundational educational opportunities in computer science *before* they start college. At the same time, such offerings typically aren’t offered at most high schools. So this summer, Lee

launched the two-week Young Data Science (YDS) for High School Students at UB. According to Lee, it is one of the few computer science summer programs for high school students offered by university faculty in the U.S. The YDS curriculum content is akin to an AP computer science high school course or an undergraduate introductory course.

The camp, which ran in the new facilities at South Hall, exposed high school students to Java, an object-based programming language; a data-driven programming language known as Python; and the field of analytics in which data is examined and used for a variety of purposes, from making companies run more efficiently to tracking diseases or anticipating markets. Luncheon lectures were delivered by UB faculty and visiting professors from CUNY, and this year’s campus also featured a field trip to the IBM Thomas J. Watson Research Center in Yorktown Heights, New York, to confer with scientists there about their work.

Key to the participant success is their ability to learn Python, a sophisticated programming language preferred for data analytics, and apply it to hands-on research projects. For Lee, it was all hands on deck as he engaged UB faculty, students, and faculty from other universities to mentor these budding computer scientists. The core of the camp is the hands-on research, which is carefully packaged and presented in such a way to challenge camp participants within a structured framework. Lee explains, “We took university-level problems that had already been researched, and modified them for high school level. Each research ‘package’ was comprised of a modified project description, sample data set, and a ‘solution’ that wasn’t released to camp teams until they had completed their projects.” This inaugural group of nine high school level and one middle school level participants were grouped into four teams for the research projects.



“Data mining can find the answers to questions that you hadn’t thought to ask yet.”

Lee explains his rationale for creating the camp. “I was getting calls from parents. ‘My son is very interested in computer science. He’s taken courses [online] through Kahn Academy, but he wants more. Who can help?’ I believe it’s our responsibility to reach out with our experience and knowledge to the community,” he says. “With YDS, I am trying to give student the opportunity to meet researchers and professors they can keep in touch with. I want them to get to know about data science. Right now, it’s a small program, but I believe it could be expanded.”

Lee compares the potential impact of big data analytics to the wealth-producing eras like the gold rush and oil age of the 1800s in the U.S. As he puts it, “Today’s ‘natural resource’ is data.” And like the gold rush and oil ages, raw natural resources are only as valuable as they are accessible and usable. As one blogger writes in Upfront Analytics, “Data mining can find the answers to questions that you hadn’t thought to ask yet.” A skilled workforce of data miners and big data analysts is indispensable commodity of the Data-driven Era. In fact, data mining provides the foundation to further develop Artificial Intelligence and machine learning, other hot commodities of this Era.

Of course, computer languages and data analytics have a multitude of applications, and those applications may be what drives the interest of younger students. YDS participant Samuel Kim, an 18-year-old Stamford teenager, explained that he wants to make movies—great 3-D blockbusters, to be exact. But in order to do that, Kim says he needs to learn a lot more about maximizing the power of computer-based animation programs used to make films like *Zootopia* or *The Secret Life of Pets*. “I need to learn to extend their capabilities of what normal people can’t do,” says Kim. “I read when they were making *Zootopia*, they had issues making the animals’ hair smoother. They had to call in programmers to help.”

Lee’s future plans continue dividing his time between research and teaching. Research conducted through his MIG lab is robust. But of equal interest is his enthusiasm for mentoring future generations of data analysts at the high school and university levels. Along with the collaboration of key engineering colleagues, he is eyeing several grants to help fund his growing enterprise. Stay tuned. ■

## How Can We Resist? }

### RESISTANCE BAND TRAINING BENEFITS PRACTITIONERS AND PATIENTS ALIKE

by Debra Kirouac

Resistance training has been shown to build strength, endurance, and power, but who knew it could also be fun? “We do a series of task specific warm-ups to music we call Chirobics,” states Christopher Good, DC, professor at UB’s College of Chiropractic. While working with students in the technique labs on their psychomotor skills training they perform a low impact start-up, then stretch, and finish with mock thrusts and resistance training to popular songs. Good favors ’80s music — sometimes to the chagrin of his students. The faint strains of Bruce Springsteen’s “Hungry Heart” sometimes fill the halls, only instead of singing “Everybody’s Got a Hungry Heart,” the lyrics morph into “Everybody’s Got a Bone Out of Place.” Billy Idol is also not spared: “Mony Mony” naturally becomes “Bony Bony.” Oh, the “thumb” foolery of it all!

While the warm-up sessions are hopefully enjoyable, Good added the exercises to his technique labs primarily for their pedagogical usefulness. They were introduced after observing that some students struggle with mastering high velocity, low amplitude (HVLA) thrust procedures because they often lack certain physical abilities. Some lack strength (the ability to generate force at a given velocity), power (the ability to generate force quickly) and/or endurance (the ability to overcome a resistance many times) in their upper and lower extremities and core. Resistance training has been shown to improve these, and generally involves free weights, swimming and water aerobics, or Nautilus and Cybex machines, but Good opts for having lab students work with resistance bands. These are commonly used by patients who are recovering from surgery or need rehabilitation after a stroke or other injury. More recently however, higher tension bands have been used in place of traditional methods of resistance training. Both types of bands are about three feet long, made of elastic, and offer low-impact training and low injury rates.

In 2013, Good started using these bands especially to help students improve their ability to apply a manipulative thrust to spinal and extremity joints. Students are introduced to the bands in their second semester, which become part of their ongoing psychomotor skill training, and are used in future classes and at home. In his classes, Good’s

students usually start with a short warm-up of low-impact aerobics, then they train with the bands, do mock impulses, thrust on mini drop pieces and practice a host of other low-tech techniques. One can change the tension of a resistance band by stepping on a different section to shorten it, or by holding both handles instead of one. Another benefit of resistance bands is that they are lightweight and compact and students (as well as patients) can easily travel with them. There are exercises for the upper and lower extremities and the spine, so routines can be created to benefit the entire body.

Good conducted a small pilot study to evaluate the efficacy of this teaching tool and student responses to an anonymous survey were presented at the Association of Chiropractic Colleges/Research Agenda Conference (ACC/RAC) this year. Responses indicated that the students felt the resistance bands were a good warm-up and improved skills and strength. While injuries were rare, those who aggravated some area typically had a pre-existing condition that had never been properly treated. Interestingly, fifth semester students seemed to have a more dramatic (and positive) response to training with the bands, probably because they were close to entering student clinic and felt a greater need to improve their abilities. The second semester students had more of a mixed outlook, though they had no prior experience with adjusting classes and may have not realized the full benefits of resistance band training.

As a result of his findings, Good has decided to create a training handout, add additional maneuvers and standardization to the routines, and offer increased tube tension for stronger students. He also added new exercises that more closely mimic HVLA thrust procedures, and is in the process of creating a video. Students are also continuously warned to pay attention to how they are feeling as they train with the bands so as not to hurt themselves. In future studies, Good will follow up with larger cohorts and measure strength, power and endurance changes, as well as other parameters of HVLA thrusts.

UB’s resistance training techniques are being noticed outside the University, too. Good visited the Canadian Memorial Chiropractic College in the summer of 2016 to further develop their training videos and share ideas. In addition, they will collaborate to develop a workshop for the ACC/RAC which will hopefully be presented in March 2017. ■





## Electro-Acupuncture } Anyone?



### UB ACUPUNCTURIST STUDIES THE SAFETY AND EFFICACY OF ELECTRO-ACUPUNCTURE TREATMENT

by Debra Kirouac

Until recently, few studies had been done on the safety of electro-acupuncture; that is, of course, until the University of Bridgeport's own Jennifer Brett, N.D., L.Ac., Director of the Acupuncture Institute, decided to change that. Brett recently co-authored (with Medeia Tsnobiladze, N.D. of UB's Physician Assistant Institute) the clinical research study, "Patient Safety and Satisfaction with Electroacupuncture in a Teaching Clinic: A Survey of Interns and Patients." The paper appeared in the *HSOA Journal of Alternative, Complementary & Integrative Medicine*.

Brett presented her study in Boston in November 2015 and also spoke to it in China. "When people think about needles, the most common question they'll ask is what it will do to their bodies. The public perception is one of fear, and it is because of best practices that we've focused our teaching clinics on safety. Electro-acupuncture is just as safe as needle-only—which has an excellent safety record—but there were no prospective studies on its safety. This means you design a study rather than gather information as things are being done, as opposed to a retrospective study, which looks at reports of problems. There are few reports like ours on electro-acupuncture. The faculty felt that the two methods had similar benefits and side effects, but we didn't know that for sure."

Before delving into Brett's research, a brief history of acupuncture should help contextualize her findings. Acupuncture has been in existence for 2,000 years but, by the 1930s, and with the advent of electricity, electro-acupuncture first came to prominence in China. It was a means of replacing the need for hand stimulation after needle insertion. By the 1970s, acupuncturists in America tended to be Korean, Chinese or Japanese, and usually treated their own communities. Western interest

in the practice soon piqued after President Nixon's press secretary, James Reston, had an appendectomy while in China in 1972. In his case, acupuncture was used in lieu of anesthesia for post-surgical pain, and he later wrote about his experience for The New York Times. Two years later, the New England School of Acupuncture opened its doors in Boston—the first college in the United States to teach Western students in the practice.

Brett's study included 163 patients—two-thirds of whom underwent electro-acupuncture while the remaining one-third participated in the needle-only modality. The clinicians focused only on the side effects—both positive and negative. "In terms of significance," Brett says, "there was slightly more cramping reported with electro-acupuncture. There was no clinical difference. We found that patient satisfaction was equal." In terms of the benefits, "Eighty percent of the patients reported feeling more relaxed afterward, and forty-five percent reported feeling more energized."

Electro-acupuncture is as its name implies: electrical currents are applied to needles that have already been inserted into the body. Small electrodes (a conductor through which electricity enters or leaves an object, substance, or region) connect two or more acupuncture points to a small electrical machine in between. For those unfamiliar with electro-acupuncture and how it looks visually, it is analogous to an outdoor Christmas tree strung up with festive lights—just with no actual lights involved, only the batteries. It is also akin to Transcutaneous Electrical Nerve Stimulation (TENS or TNS), which is the electric current produced by a device to stimulate the nerves for therapeutic purposes.

An interesting aspect of electro-acupuncture is that there are parts of the body that should be avoided: "There are a number of bodily functions that are related to

electrical stimulation," Brett says. Accordingly, the faculty do not perform this method over the heart or across the spine or spinal cord, as it could interfere with the body's natural rhythms, and brain function could be affected. Since 2003, UB's Acupuncture Clinic has performed both modalities on its patients, though clinicians initially default to needle-only until further information is gleaned from the patient. Student interns often perform these services to patients under the supervision of our clinicians. After an initial consultation, which take longer, subsequent visits typically last about one hour, with needles staying in place anywhere from 20 to 40 minutes.

Depending upon the severity of symptoms, acupuncture can be used as a curative measure by

decreasing a patient's reliance on pain medication, or as a palliative measure, managing symptoms of chronic, systemic disease. Both modalities have also been utilized to treat everything from fertility and gynecological issues—by stimulating blood flow to the uterus and regulating hormones—to the paralysis or weakness of the facial muscles affected by Bell's palsy. Regardless of why a patient comes in for treatment, acupuncture, done alone or in conjunction with traditional Western medicine, may help enhance a patient's quality of life—the best side effect of all.

The research was funded in part by a Seed Money Grant from the University of Bridgeport. ■

**"Eighty percent of the patients reported feeling more relaxed afterward, and forty-five percent reported feeling more energized."**

### Business Management } Spanning the Globe

#### A SCIENTIFIC APPROACH TO THE STUDY OF HUMAN BEHAVIOR IN THE GLOBAL WORKPLACE

by Christine Hempowicz

Job satisfaction and dissatisfaction, the match between job opening and ideal candidate, navigating the multinational conglomerate workforce—we are cajoled by the likes of Career Builder, Indeed, and Monster.com are ready to help us find our dream job. We go through the process—create an account, submit a polished résumé, invited for an interview, a second interview and, if lucky, we’re hired! In the difficult job market of recent years, popular news reports focus on getting a job, any job, and being glad you got it. So take heed because, as the old adage goes, be careful what you wish for, you might get it!

Seasoned veterans of the workforce, take a minute and think. Out of all the jobs you have ever had, which was the best? Which was the worst? Have you had a job so exciting that you almost felt like it’s a “sin” to get paid? Or, what about the job that you had to drag yourself out of bed for day after day? No doubt you have experienced both the highs and the lows in the course of a long term job. But when the lows drag on and become the norm, you start thinking of moving on or you might just try to make the best of it and wistfully wish you were one of the lucky few whose employer is on the Fortune’s “100 Best Companies to Work for” list.

Fortune’s list is sort of like a “customer review” for employee feedback. They’re surveyed in areas of trust and workplace culture to come up with results that capture locales with the highest scores for management credibility, camaraderie, hiring practices and the likes to produce this nationwide list. Fortune’s list is not unique; other surveys are administered within the U.S. and worldwide by companies like Glassdoor’s “Best Places to Work” and the “101 Best and Brightest Companies to Work For” award.

Carrie Picardi, Ph.D., assistant professor of management in UB’s Ernest C. Trefz School of Business, is intrigued by

this phenomenon of employees’ workplace perceptions. Theorizing that organizational appeal can be attributed in part to its personification by current and would-be employees, Picardi, an organizational psychologist, is developing a survey instrument that incorporates Hofstede’s cultural dimensions of organizations with organizational personification indicators. Hofstede, a 1970s trailblazer in organizational social psychology, conducted extensive research to identify quantifiable dimensions of organizational and national cultures. Picardi’s instrument includes these cross-cultural dimensions but adds questions that are designed to measure the level and facets of how employees attach human qualities to their company.

According to Picardi, considerable market research of this type has already been applied to branding, but her interest extends to the organization as a whole. So she applies the market research approach as applied to branding, and modifies it to measure employee satisfaction in their workplace vis-à-vis the personified workplace culture.

But Picardi doesn’t stop there; she goes full circle. Not only is she interested in how employees anthropomorphize their employers, she has also worked on developing and validating competency models and assessment blueprints for company use in vetting potential employees. While at first glance these two research interests might appear unrelated, an end game of sorts could be the best match employer-employee match.

Much like the highly sophisticated backstory to the popular online relationship services provider, eHarmony, Picardi and fellow researchers have sought to identify the global company’s preferred competencies for leadership for global enterprises, followed by the development of an instrument that could measure the associated behavioral standards. This scientific approach to the study of human



behavior in the workplace could produce commercial benefits. At present, phrase-laden resumes and cover letters provide a watercolor view of the applicant and employers often must rely on word-of-mouth, who-knows-who introductions as the litmus test to identify those best suited to the job from the pile of applications. Automated systems rely on electronic document scans to identify and quantify appropriate phrases. The development of a valid, reliable instrument that could identify and measure the desired competencies objectively could boost the employer-employee successful match to new levels. The result, Picardi speculates, could be the match of the applicant’s strength of cultural competencies with the employer’s culture within its inter-continental company operations. In this case, the win-win would be that the employer gains a culturally competent employee and the employee gains the satisfaction of working

for an employer whose culture reflects those desired by the employee.

This is a research trajectory that Picardi expects to be on for quite a while. And with the explosion of multi-continental businesses and the “shrinking” globe, there should continue to be a hot topic in the field of organizational psychology and international business.

Plus her interests don’t stop there. Picardi is also keenly interested in disseminating her growing expertise for use in the classroom. In 2013 she co-authored the textbook, *Research Methods: Designing and Conducting Research with a Real-world Focus*, (Sage) and is currently working on two new books on workforce assessment; the first focuses on design and development and the second, a companion piece, presents tools and techniques for assessing the existing and prospective workforce. Stay tuned. ■



## I, Too, am Harvard: }

### HOW AFRICAN-AMERICAN STUDENTS CONTINUE TO EFFECT CHANGE IN IVY LEAGUE COLLEGES IN THE NORTHEAST

by Debra Kirouac

When one thinks of students banding together to effect change, images of Ohio's Kent State University and the University of California, Berkeley – with their student-led protests against America's invasion of Cambodia (1970) and their involvement in the Free Speech Movement (1964-65), respectively – come to mind. In fact, most literature on the history of student activism does dedicate a lot of its narrative to these two events; however, while vitally important, the individuals involved were overwhelmingly upper middle class — and white. Far less is known about the impact African-American student activists have made, dating as far back as 1950, in the Ivy League universities in the Northeast, like Harvard and Radcliffe.

This is precisely what Afrah Richmond, Ph.D., assistant professor of social studies in the School of Education, and herself a Harvard alumna, is exploring in her new book manuscript. “My work is to highlight the actions of African-American student activists. It looks at northern

sites of the Civil Rights Movement and is a case study that, while representative of the larger struggles of students at elite Northeast colleges, has a larger focus on Harvard and Radcliffe.”

Richmond's work investigates the ways in which Black students in the north also effected change during this period of social upheaval...particularly in the 1960s. Her research is ongoing and spans seven decades – from 1950 through 2015 – and falls under the umbrella of Long Civil Rights Movement Literature. In fact, Richmond's thesis is how African-American students played a key role in transforming the definition of their day-to-day reality. “Over the course of this long struggle, there were disappointing retreats and climactic victories.” Richmond delineates the four areas in which these students had an impact: they demanded a larger presence of African-American professors; called for more Black administrators; requested a more robust recruitment of students of color; and wished to integrate African-American studies as a legitimate part of

the academic canon. They literally transformed the definition of what it meant to be educated, for both Blacks and Whites. With the eventual assistance and support of academics, African-American Studies became a legitimate field of study, alongside math, English, science and philosophy. The works of Maya Angelou and Langston Hughes were now included as part of a larger pool of well-known writers and philosophers. “It legitimized the African-American cultural output along the lines of others in Western society: the Greeks, the Enlightenment philosophers, Shakespeare,” Richmond notes. “The actions of a small band of 18 to 22 year-olds really did shift notoriously conservative universities into becoming more modern; we could now think of institutions as possessing racial, gender and sexual orientation equity. These students were the powerhouses.

“In 1969, the Harvard faculty voted to create an African-American Studies department and the administration agreed to implement their other requests to increase the population of Blacks on campus,” Richmond says. “Although the activists achieved

a critical victory in the form of university agreements, it would take nearly twenty years to fully realize Black studies at Harvard, which, in the 1990s, came under the leadership of Henry Louis Gates, Jr. In addition, the number of Black faculty, students and administrators fluctuated during that time period, from the early 1970s to the present, which underscores the need for continuing the long struggle for genuine racial equality at Harvard.”

On the heels of the Black studies movement—particularly at Harvard and Radcliffe—we saw the first wave of women's rights and counterculture, and the integration into academia of the Latino, Native American and Asian studies fields. Queer studies came later, in the mid-1980s, and the international movement against Apartheid in South Africa, which first started in the 1960s, also gained greater momentum at this time.

Richmond explains that while an undergraduate student at Harvard, although active, she really didn't understand the struggle African-American students before her had experienced. (She realized the full impact of what they'd advocated for as a graduate student at New York University, at which point her research for a term paper on this topic began in earnest.) But clearly she benefited from

her predecessors, walking Harvard's hallowed halls during the Dream Team Era of African-American studies. “Under the guidance of Henry Louis Gates, Jr., who has been one of the major forces of the revitalization and prominence of this field of study in a way that papers over the continuing need for true racial equality at Harvard....He got the top people in all their fields, from Cornell West and noted scholar Evelyn Brooks Higginbotham, to teach.”

Every generation expresses itself using the language of its day. In 2016, that language is social media. “Students have started a social media campaign called ‘I, Too, Am Harvard,’ which is inspired by the Langston Hughes poem ‘I, Too, Sing America.’ It is a pretty savvy media presence that depicts the day-to-day indignities that current Black students at Harvard still endure.” As an historian, Richmond has noticed over the course of this long movement the idea that somehow Black students are unworthy of a Harvard

**“Black students say there is still a need for ongoing attention to the struggle for true racial integration and equity.”**

acceptance; that they are somehow underqualified for admission. “I, Too, Am Harvard” is their response to what sociologists call “micro-aggressions” – everyday verbal or non-verbal snubs that, whether intentional or not, communicate derogatory messages to the recipient. “There needs to be administrative will and structures to listen to and address student concerns.”

Richmond addresses bureaucracy: “At universities, change is slow; the current social climate is usually what determines bureaucratic response. Right now there are certain inflection points – hashtag Activism, like ‘Black Lives Matter’ and ‘I Too, Am Harvard.’ The actual movement is inchoate right now, it is amorphous,” Richmond says. “Black students say there is still a need for ongoing attention to the struggle for true racial integration and equity. There is a desire to be seen as equal; as co-equal parts of the university body. One has to acknowledge the things Harvard has done right but also understand the voices of the young people who've always called Harvard to task to be a place of true inclusiveness. In many ways, the conversation of equity and access is not just a Harvard story. Even here at the University of Bridgeport—as professors—we have to wrestle with and be responsive to the students' needs and desires, because universities ultimately are empowered by their young people.” ■



## A Better Air Test }

“Pollutants that are 2.5 microns or smaller are the most dangerous. When they are inhaled they go deeper into the lungs but not out, and they cause much more damage to the lungs”

—Xingguo Xiong



by Leslie Geary

BY USING MEMS TECHNOLOGY, PROFESSOR XINGGUO XIONG'S TRACKS MINISCULE POLLUTANTS THAT POSE BIG HEALTH THREATS

When engineering professor Xingguo (Michael) Xiong, Ph.D., was in China last summer, he immediately noticed the smog and air pollution. “The economy has developed very quickly, but because of manufacturing and new construction, there’s a lot of pollution and the air is very foggy, especially in large cities.”

Air pollution regularly reaches dangerous levels in China, which monitors its air quality and posts warnings when needed. But Xiong, who is an associate professor of electrical and computer engineering at UB, wondered if there might be a better way to help individuals protect their health. Air quality can vary widely among specific neighborhoods, he explained, but government air monitoring covers larger areas, like entire cities.

“Maybe there’s a lot of construction in a local area or a lot of manufacturing. If someone wants to do exercise in the park and only rely on government data, the city value may be different than the local value,” he said. Thus began his work to create a personal air-monitoring system, called a PM 2.5 sensor, that could specifically detect miniscule air pollutants that post the greatest threat to public health.

“Pollutants that are 2.5 microns or smaller are the most dangerous. When they are inhaled they go deeper into the lungs but not out, and they cause much more damage to the lungs,” says Xiong. “They do have devices that can measure particulates that are 2.5 microns, but they are large and very expensive.”

To turn his vision into reality, Xiong and his graduate students are harnessing super-small micro-electrical mechanical systems (or MEMS for short), since they allow the size of air-monitoring systems to be greatly reduced, says Xiong, who likens his work to driving a car.

“MEMS technology integrates both electrical circuits and mechanical components into a single system, on-chip, so that it can accomplish tasks which cannot be completed by electrical circuit alone,” Xiong explains.

“Taking our human body as an example, if you want to drive a car, you need a smart brain so you know where to go. But this is not enough. You also need eyes, which are sensors to see where you’re going. You need to use arms, hands, and feet, which are actuators to maneuver the car. MEMS technology allows us to greatly reduce the size of mechanical sensors and actuators, which are like the eyes, arms and legs, so they can be integrated with a microelectronic circuit, which is like the brain. Together they can implement a wide variety of functions for many applications.”

Initial result based on computer simulation looks encouraging for Xiong to apply for funding to make prototypes.

“MEMS allow us to greatly reduce the size of the PM 2.5 sensor, so that it will become more portable and affordable as a carry-on device to monitor the air quality for health protection,” says Xiong, whose device is planned to run on rechargeable, energy-efficient batteries and cost no more than \$100. ■



Ready—Set—Print! }

## 2-D BLUEPRINTS COME ALIVE IN UB'S 3-D PRINTERS

by Christine Hempowicz

UB's 3-D Printing and Advanced Manufacturing Center is part print shop, part modeling workshop, and altogether a hub of research and innovation, bringing ideas from blueprint to three-dimensional prototype or working model in a matter of minutes to a few hours.

Established in the fall of 2014 by UB's School of Engineering, its five 3-D printers, 5-Axis milling machine, robots, visual sensors and 3-D scanners are continually in high demand, occupied by students and class projects, supporting visualization of data analysis models, and building prototypes and parts for student and faculty entrepreneurs. Area companies routinely stop by to see a demo of the 3DP100 Dual Extrusion Printer (1m \* 1m \* 0.5m Build Area), the Center's pièce de résistance and the only one of its kind and workspace volume in Connecticut. This latest generation of 3-D printers was acquired in the fall of 2014 and has been used by UB design students to print, among other things, a large scale model of Bridgeport's new Bass

Pro Shop for the firm that oversaw the construction of the new facility.

These days, UB's CanSat student team has put in extra hours in the 3-D laboratory to prepare for June's competition in Burkett, Texas. Their charge: design, build and fly a soda-can-size satellite simulator that is launched via rocket and deployed with a controlled, glided descent during which the sensor payload samples air pressure, temperature, and includes a camera that will take photos of the ground. The CanSat team is relying on the Center's 3-D printers to perform critical design and parts manufacturing. Two members of the team have been awarded Connecticut Space Grants for the project and to cover travel costs.

No doubt the equipment in this modern manufacturing center will continue to be in demand as students, faculty, and guests come in with ideas and leave with their model in hand. ■

# 9-Dashes, 6 Countries, A Map & A Mission



## UB SCHOLAR AIMS TO CALM THE CHOPPY GEOPOLITICAL WATERS OF THE SOUTH CHINA SEA

by Lisa Calderone

Let's just say, "It's complicated." History. Geography. Topography. Economy. Politics. Law. Chunjuan Nancy Wei's, Ph.D., research on the sovereignty disputes in the South China Sea (SCS) is interdisciplinary in nature and deeply evocative among the nation states and allies involved: Mainland China, Taiwan, Vietnam, the Philippines, Brunei, and Malaysia. For Wei, it's also personal.

Like the intricate ties of the many countries with a stake in the land and seas in East Asia, Dr. Wei has personal ties to multiple countries. As Wei, associate professor at the College of Public and International Affairs (CPIA) and Chair of the East Asian and Pacific Rim Studies (EAPRS) program, wrote in her grant application that sent her to Taiwan on a Fulbright for the 2014-15 academic year:

*"It has long been my goal to complete a manuscript contributing to understanding the complicated political and economic relationships among the Republic of China (ROC, or Taiwan), the People's Republic of China (PRC or China) and the United States of America (USA). Part of the motivation is personal. While my parents and grandparents were born citizens of the ROC, currently headquartered in Taiwan, my daughter and I were born PRC citizens, and now we are both*

*naturalized citizens of the USA. My ultimate motivation comes from my academic training in both American and Chinese universities, and my enduring intellectual curiosity as a professor specializing in East Asian and Pacific Rim Studies at a private New England university."*

Driven by her desire to see peace among her home country, her adopted country, and the rest of the world, Wei applied for a UB Seed Grant followed by a Fulbright grant to better understand the underlying causes of the centuries-long disputes between China and neighboring nations that are still making headlines today. She was granted both.

"It's enormously complicated," explains Dr. Wei when asked to report on her findings now that her grants have been fulfilled. "The more I learn, the more I realize this conflict is not going to be easy to resolve. It's an issue of nationalism—which tips toward a more emotional rather than rational response—for each nation involved. War is likely to break out if they don't find a diplomatic way to address this ongoing dispute. And that's going to be a disaster for the U.S., China, Taiwan, and every other country in the region."

Tobias Yasutake M.A. '17 couldn't agree more about the density of the matter. "Like the Israeli-Palestine conflict, it's



This 1898 French geopolitical cartoon depicts the end of dynastic rule in China that had been established with the Xia dynasty around 2,000 B.C.

a complex thing that does not have a clear answer and seems more confusing the more you research into it," Yasutake says when asked to sum up his understanding of the SCS after completing Dr. Wei's new course, "Chinese Foreign and Economic Policy"—a direct outcome of her dual-grant research.

### Muddy Waters

To put Wei's research into context, it's helpful to look at the geography of the area. Relative to the United States, China is situated in an exceptionally congested region. Internally, China has roughly the same land size as the U.S. but nearly five times its population (310 million Americans versus 1.4 billion Chinese). Externally, China has 20 neighbors, 14 land and six maritime, while the U.S. has two, Mexico and Canada, with no maritime neighbors off its East and West Coasts. Together with Russia, China has the largest number of land borders with neighbor states of any country in the world: North Korea, Russia, Mongolia, Kazakhstan, Kyrgyzstan, Tajikistan, Afghanistan, Pakistan, India, Nepal, Bhutan, Myanmar, Laos, and Vietnam; it also has six maritime neighbors: South Korea, Japan, Philippines, Malaysia, Indonesia, and Brunei. Unlike Russia, China remains a divided country with a 21st neighbor, Taiwan. The existence of a rival regime as the Republic of China in Taiwan threatens the political legitimacy of the government in Beijing. In addition, many of the Chinese national treasures and historical records are still kept in Taiwan. With a recorded history dating back to 2100 B.C., China has gone to war with nearly every neighbor, and the skirmishes continue to this day.

A snapshot of the conflict and the focal point of Wei's research can be found in an historic map published by the Republic of China (ROC or Taiwan) in 1947 that featured an eleven-dash line in the South China Sea. Later the Chinese government removed two dashes after negotiations with the Vietnamese, leaving the now infamous nine-dash line claims. Poorly defined, the nine-dash line is at the crux of the South China Sea dispute. The ambiguity of the dashed lines and the lack of actual exercise of sovereignty by either China or Taiwan of some of the islands sustain the conflict.

According to Wei, the 1947 map published 172 names: 15 naming the island groups and 157 naming features such as the specific islands, islets, shoals, banks, cays, and reefs. Many of the names reflect stories from the Ming dynasties' famed Zheng He voyages, various Chinese diplomatic missions to the Southeast Asian nations, and Chinese values reflected in Confucian teachings. In addition, the stories also reflect initial American support of Chiang Kai-shek's retaking some of the islands at the

end of WWII. Her forthcoming book (due out by 2020) tentatively titled *Names and Imagination: The 1947 Chinese Map of the South China Sea*, will be another product of Wei's research efforts.

Couple the 1947 map with a French geopolitical cartoon circa 1900 depicting imperial powers dividing China against the will of the then Qing dynasty, and one gets straight to the crux of the SCS conflict – territorial entitlements. The cartoon was published during China's "Century of Humiliation" that began in 1840 and peaked during the First and Second Opium Wars with the British, followed by further wars with the French and Japanese. After 5,000 years of civilization leading to China's economic world dominance circa 1820, China was broken into pieces as colonization in the area began. France colonized Vietnam; the Dutch colonized Indonesia; Great Britain colonized Malaysia; and the U.S. colonized the Philippines. In short, all major powers at the time grabbed a piece of East Asia when China was at one of its most vulnerable points in its history. Since 1841, a series of "unequal treaties" signed by the Qing dynasty conceded major port cities to Western control and legalized the opium trade that led to many Chinese becoming drug addicts. The point of Western entry into China—and subsequently its downfall as a great power—was invariably the South China Sea.

Enter the map of 1947 and Greater China's claims in the SCS. While the map remains a matter of dispute as it was unilaterally declared by China, the entire region is today the world's most vibrant area economically, thereby turning the six neighboring countries into geopolitical "bumper-cars." International trading routes connecting the Indian and Pacific Oceans encircle the 3.5 million square kilometer surface area of the islands, amid waters rich with oil and gas reservoirs. The world's second (China) and third (Japan) largest economies are both in the area, exponentially increasing the value of the region in today's global economy.

According to Wei, the U.S. is geographically at an advantage because we can "own" the waters 200 miles off the East and West Coast – an announcement President Truman declared unilaterally in 1945 after World War II without pushback from any other country. In turn, Chinese President Chiang Kai-shek produced the 1947



The 1947 post-WW II 11-Dash Map of the SCS has been controversial in recent years.

map proclaiming territorial rights, but was met with and still faces great resistance to this day. “In the Chinese region, it’s extremely complicated because there’s overlapping geography,” Wei explains. “It’s very unclear who owns what, and every strip of water has an economic impact so there are lots of disputes.”

High drama on the high seas? It’s an ongoing saga as relevant today as it has been for three centuries. At the forefront of today’s SCS tumult are the strategic building of artificial islands from rocks and reefs in the Spratly archipelago that are being used for the construction of airstrips. While the scale of land expansion by China far outweighs the others, Wei is quick to point out that Beijing was not the first but the last party to build in the disputed waters. The Philippines and Vietnam both started to build in the 1970s, Malaysia in the 1980s, and Taiwan in the mid-2000s. Even in recent years, satellite pictures demonstrate that Vietnam has been expanding some of the islands since 2009.

On July 12, 2016, the Permanent Court of Arbitration in The Hague, Netherlands handed down its highly anticipated verdict in the *Philippines v. China* case on the maritime entitlements of the South China Sea in favor of the Philippines, virtually dismissing the nine-dash line as invalid, with no legal basis.

The dispute will invariably continue. As John Falzerano M.A. ’16, whose term paper turned into a co-authored article with Wei that was published in the *Yonsei Journal of International Studies* entitled “Making Waves: Recent Developments of the South China Sea Disputes,” points out, “every couple days something new happens in world events involving the South China Sea.” During the writing of the article in 2015, Falzerano was surprised to find how current he needed to stay in the news surrounding this highly controversial topic.

### A New Core

At the core of Wei’s work is her classroom. Towards that end, “Chinese Foreign and Economic Policy” is already impacting the UB experience for her students. Her research is inspiring their research, and in turn students are inspiring each other by sharing their interest areas through engaging classroom discussion.

For Falzerano, understanding how the SCS disputes interfere with China’s relationships with the Philippines, Malaysia, Japan, Australia, the U.S., Brunei, and Vietnam—and attempts at establishing foreign policies with them—was more intriguing than whose claim on specific SCS territories

was strongest. Thus “Making Waves: Recent Developments of the South China Sea Disputes,” concludes with:

*This paper updates the competitive engagements between Washington and Beijing and between Beijing and its SCS rivals over the South China Sea. The analysis of various attitudes in the SCS issues indicates that the ASEAN members, less Vietnam and the Philippines, see no reason to jump on the anti-China wagon. For East Asia’s security, prosperity, and dignity, it is high time that the policy community in various Asian capitals contemplates diplomatic solutions to prevent further escalation of the disputes.*

Falzerano’s biggest takeaway from his research? “The SCS disputes aren’t necessarily China’s fault, but they’re China’s problem,” he says. “Basically China’s dealing with a problem that a bunch of other countries left for it.”

In writing his paper “Saving Face: The Avoidance of Shame in East Asia,” Tobias Yasutake M.A. ’17 explored the enduring impact the Century of Humiliation has on modern day Chinese politics. He points out that the Chinese psyche has been deeply altered so much so that today the avoidance of shame now drives just about every political move. “A Westerner might see that century and think, ‘that is the century where their country made mistakes and lost,’” Yasutake writes, “rather than understand the true gravity of psychic trauma the period inflicted.”

Taking this thought process a step further, Yasutake postulates that “China and Japan are trying to avoid shame by blaming the other when both of them are at fault.” He writes that according to a 2014 BBC survey, “the BBC found that of all countries surveyed, no country hated China more than Japan, and no country hated Japan more than China.” The concept of “Saving Face,” a spin-off from the Century of Humiliation, keeps the wedge between these two countries locked in a stalemate. “A foreign decision that humiliates one’s country can inspire dangerous levels of patriotism, such as when, in 2012, rioters in Beijing rallied outside of the Japanese Embassy and demanded that China go to war with Japan over the Senkaku Islands,” Yasutake writes, referring to a recent East China Sea conflict that was discussed in class.

Other students in Wei’s new course strayed from the SCS topic to follow their inquisitiveness in further matters related to Chinese foreign and economic policies. For example, with friends in Kenya, South Africa, and Angola, Hyon Chol Chung To (Joseph) M.A. ’17 directed his attention to Chinese-African trade relations. He learned that China’s Economic Miracle led to a recent (early 2000)

outreach to Africa that has experienced exponential growth, from hundreds of millions of dollars to \$40-45 billion in trade per year. “China needs lots of resources, particularly metal, to stay competitive in the cell phone industry, for example,” shares Joseph. “In exchange, China invests in the South African region’s infrastructure in terms of transport. What my research found was that African leaders welcome support from China because China doesn’t consider political bent in their policies, but what is beneficial to both countries at the time.”

Research findings such as the ones mentioned above stimulate discussions in Wei’s classroom and invigorate intellectual curiosity. For Joseph, “The course was highly engaging because we all gave presentations on our term papers, and we all got to speak our mind during class, sharing our different points of view. Wei would give us her point of view, we’d look at facts and figures, and then discuss. It was my first class in the EAPRS graduate program and I wasn’t sure what I was getting into, but it was really very well designed. Everything went smoothly, and I learned a lot from my classmates.” Joseph also appreciated Wei’s readiness “to help with anything you need,” as well as her direct experience with the topic. “If you need resources in Chinese she’ll point them out to you,” he shares, “including fellow classmates who speak Chinese.”

Tobias Yasutake M.A. ’17 agrees. “The homework readings were heavy but fun, as the class was three hours long but half of that was devoted to class discussion on the readings. So not only did you get multiple perspectives on the readings from the teacher and students, but you got to know everyone really well. I found the class very interactive and engaging.”

As Wei’s graduate assistant in 2015-16, Falzerano grew both academically and personally under her mentorship. “I learned more just sitting and talking with Dr. Wei in her office on top of what I was already learning in her classroom. I graded undergraduate papers, I covered a couple of classes for her so got a chance to teach, and according to my family I got out of my shell since I started working for her. I wasn’t social before but now I’m willing to connect more with others because Wei encouraged me to speak up and engage. She listened to what I had to say, agreed with it or countered it or learned from it – and ‘being heard’ is empowering!”

### Calming the Waters

At the forefront of the SCS geopolitical conflict, Wei’s groundbreaking work is already making splashes now that she is back home.

The syllabus for “Chinese Foreign and Economic Policy” was based on her research and has been selected by the EAPRS faculty and the Dean of CPIA, as a core (mandatory) class for the EAPRS graduate program. On November 10, 2015, Dr. Wei was invited to Brussels to participate as a panelist in a leading think tank Friends of Europe event entitled “The Asian Paradox: Rising Wealth, Lingering Tensions” with her topic “Asian Security Tomorrow: Working for Peace in Our Time.”

With peace as her primary motivator, Wei published an article on May 21, 2015 in *The Diplomat* entitled “Beijing’s Formidable Strategy in the South China Sea” that proposes a solution to the SCS conflict. She writes, “There seems to be no better policy than Beijing’s long-time official stance of shelving disputes and jointly developing resources (*gezhi zhengyi, gongtong kaifa*), arguably a more feasible and forward-looking approach than military responses.” In her article “Economics and Geopolitics: Crafting a Joint Development in the Spratlys” published on the Friends of Europe website, she further expanded on how this joint development could be implemented in a win-win situation.

Finally, in addition to *Names and Imagination*, Wei plans to publish a second book based on her Fulbright work tentatively titled *Nested Games Among the South China Sea Islands*, focusing on her game theory.

Wei expounds, “Understanding the game theory is truly liberating. I’m no longer bound by which country is right and which one is wrong in the South China Sea, but instead I am focused on understanding—and then teaching—the fundamental game that’s being played among the many stakeholders in the area. Likewise, guided by the nested games theory, I predicted that Brexit would happen before it actually did, and I am watching the 2016 presidential election closely from the games theory vantage point as well. The election is not about who’s right and who’s wrong, but how the game is being played.”

On a more personal level, Wei’s research led her to an even more momentous epiphany: her self-identity.

“My research clarified who I am,” shares Wei. “I am an American who has ties with Asia. And that’s my passion – understanding that part of the world. My personal mission is to be a bridge between cultures. Only when we understand other parts of the globe can we truly bring peace to the world.” ■

## Ascending to Greatness }

### ONE PROFESSOR'S COMMITMENT TO ENGAGING THE NEXT GENERATION OF ENGINEERS

by Debra Kirouac

In the unincorporated town of Burkett, Texas, the month of June ushers in more than just oppressive heat. As participants in the Design/Build/Launch CanSat Competition (originally named for a satellite-type payload small enough to fit into a large soda can), engineering students from approximately 40 colleges and universities—the University of Bridgeport among them—gather at the Jim Burkett Ranch to launch their payloads, which are placed in the nose of five-foot-tall rockets. From the vantage point of the rockets as they soar overhead, the budding engineers anxiously await the data from their rockets to be transmitted to their ground stations.

Started in 2005, the CanSat Competition is a three-day event sponsored by the American Astronautical Society (AAS) and the American Institute of Aeronautics and Astronautics (AIAA), with financial and volunteer support from the United States Naval Research Laboratory (NRL), NASA Goddard Space Flight Center and the Jet Propulsion Laboratory (JPL). No more than ten students (graduate and undergraduate) are allowed per team to represent their school in Texas, although here at UB, far more work together to build a payload that meets the NRL's and NASA's stringent specifications for eventual launch.

But the road to Burkett is not without speed bumps. At UB, creating a scientific payload is a team effort, requiring the specialized skills of the electrical, mechanical and computer science and engineering departments. Students from each discipline learn how to work together as a group to achieve an end goal, a vital skill necessary for highly-coveted internships and employment post-graduation. Jani Macari Pallis, Ph.D., associate professor of mechanical engineering and UB's campus director for the Connecticut Space Grant College Consortium, highlights the importance of a strong team approach: "Students in electrical and computer engineering determine the processors and electronics we utilize. They have to figure out all the power, communications and components used. The mechanical engineers work with the payload's housing (structure) and aerodynamics; the computer scientists have software to develop for data acquisition. And everyone is concerned about the total mass when all the components are finalized since there is a weight restriction. It's a nine-month project on top of their other coursework. They all have to work together. This is UB's third year in the competition and I couldn't be prouder of their hard work."

# BREAKTHROUGHS

## in Mechanical Engineering



The goal is for all teams to experience, on a small scale, a typical aerospace program from preliminary design review to post-mission debrief

Students begin with a Preliminary Design Review (PDR), followed by a PowerPoint presentation and a Critical Design Review (CDR), which addresses all competition technical requirements of the CanSat, including safety. The students are then required to do a Skype presentation for an independent panel selected by the AAS, and the students' submitted materials have to be different every year. Originally, the payload had to be small enough to fit in a can, but that requirement has since been lifted. Some of the structural components are created here on campus, utilizing one of the 3-D printers that was recently acquired by the University.

Each year, the competition has a different "mission" (challenge). The challenges simulate real world space missions where science vehicles travel through and sample a planetary atmosphere. Teams have to address telemetry requirements, communications and autonomous opera-

tions in their designs. In 2015, the CanSat satellites had to implement a system which would deploy to slow the CanSat down without using a parachute; UB students used helicopter-type blades. This year, a glider has to deploy from the CanSat and has specific flight range requirements as well as specific instruments and sensors used to record velocity and pressure. The CanSats have to record the data and transmit while in flight to the teams' ground stations. The goal is for all teams to experience, on a small scale, a typical aerospace program from preliminary design review to post-mission debrief.

Pallis is the main faculty advisor and provides ongoing support to the CanSat team. She joined the UB faculty in 2008 after founding and serving as CEO of Cislunar Aerospace, Inc. for more than a decade and is the driving force behind multiple grant awards received by UB engineering students in recent years. Pallis is the editor of a children's

book, *The Big Book of Air and Space Flight Activities*, serves on the Advisory Council of Bridgeport's Discovery Museum and Planetarium, and has co-developed a number of high school-level aerospace courses for the Aerospace/Hydro-space Engineering and Physical Sciences school at the Fairchild Wheeler Campus.

Bashar Alhafni, a junior at UB majoring in computer science and minoring in math, was part of last year's software design team. "The competition organizers provide the rocket frame. We create a container to protect the payload's glider from hard deployment. We are not allowed to put any electronics in the rocket frame." Speaking to the aforementioned glider that has to deploy in this year's Competition, Alhanfi adds: "The glider is like an airplane – it'll glide with a thousand-meter diameter and once it starts gliding, we need to measure the telemetry data from the rocket." This type of data refers to the CanSat's pressure, tem-

perature, speed and acceleration after launch. Alhafni was also instrumental in creating UB's Aerospace Club which, in addition to offering new ways in which students can participate in aerospace projects, helped UB's CanSat team to obtain UB Student Government Association funding for their project. AAS caps the budget for the final CanSat to be launched at \$1,000.

Alhafni, who hails from Syria and began his studies at UB in 2013, insists that collaborating under pressure on the CanSat Competition builds important skills that will ensure students' future success. "Two of my friends now work for Sikorsky; another interns at Lockheed Martin. One day I hope to work for NASA or Space-X." UB's mission states that our "programs will prepare students with the professional skills and intercultural competency to succeed in today's global marketplace." In return, our students bring to UB the intelligence, talent and vision that will help us all succeed in a way that is truly out of this world. ■





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