



## Reimagining Waste

BY ELISE TAKEHANA

Patricia Kio worked as an architect in Nigeria for over a decade before she came to Texas A&M for her doctoral degree, where she and her fellow architecture students worked closely with engineering faculty and students to determine alternative construction materials from industrial scrap metal or byproducts. This work included determining sources of reliable scrap material, finding a use for that scrap in construction applications, designing and building prototypes of such cross-industry solutions, and calculating the energy savings from the alternative build materials.

As an architect, Kio found it perplexing how difficult it could be to convince individuals to build more homes, even if they had the means and there was a need. While she was not especially thinking of reused materials in her designs then, she felt that having ready access to affordable building materials would help encourage more construction. Now, as an academic, Kio's work tries to show the building industry that reused materials are not simply more affordable – that argument is already evident – but that reused materials have comparable or better durability, performance, and ease of maintenance than commonly used new materials.

While at Texas A&M, Kio and Ahmed Ali worked on a design project to repurpose scrap metal from an automotive plant into modular metal planters that were installed on an institutional building; the scrap metal was transformed into a modular living wall and installed in front of a recessed brick wall. The modular living wall had a cooling effect during the summer months and a warming effect during the winter, insulating the building without introducing issues with humidity from the soil and plant material. She also contributed to another reuse for

single-use plastic matrix trays used for packaging integrated circuits. While she and her collaborators entertained twelve different applications, they ultimately built prototypes and tested an automatic shade made of the trays. She has also begun the hunt for common waste products in the region. One such item is used solar panels. Kio is looking into how companies in this region handle discarded and decommissioned panels.

During the Fall 2022 Research Week, Kio shared her work in progress on repurposing decommissioned wind turbine blades, which are currently ground to mix into cement or cut and buried for disposal, wasting the efforts put into initially creating the blades. In this project, rather than start with supply, she first considered regional demands for building materials. She eventually found 13 promising applications, with wall material showing the most potential. Findings from this work will be presented at the Architectural Research Centers Consortium in April.

Kio's work contributes to a circular economy, which privileges reusing and recycling materials for as long as possible. In a circular economy, buildings are designed for disassembly where individual parts are inventoried so they can be reused when the building is no longer necessary. According to Kio, the most pressing challenge to the circular economy is being able to find data on what scrap is available from what industries and at what scale. If the process of finding industrial scrap and byproducts was more efficient, embracing the circular economy would be easier.



Since she joined the Engineering Technology department at Fitchburg State, Kio has enjoyed learning more about American residential building processes since homes here are made with very different materials and designs than those found in Nigeria. She worked with her freshmen students in the Engineering Graphics course to develop their graphic skills from sketching to AutoCAD drawing (Fig 1).

In her Building Design course, sophomores and juniors are enhancing their knowledge of residential building construction, enabling them to translate designs to building information models for construction purposes. Students

collaboratively researched and created sustainable office designs (Fig 2a-d). A handful of her Building Design students are also working on the Solar Decathlon Design Challenge to retrofit an office building into a zero-energy building.

In the Spring semester she will work with students on an Epidemic Urbanism Initiative design competition called "Adaptive Reuse: Design Transformations for Community Health Center." The goal of the design competition is to provide a setting where students, teachers, designers, thinkers, architects, artists, and healthcare practitioners can collaborate to create and discuss design ideas based on adaptive

reuse that promote architecture for equitable, healthy communities.

Kio is concluding work with colleagues on reusing scrap metal to create metal bricks by testing their thermal performance as building envelopes. She is also working on another project to minimize graduate student housing insecurity and homelessness. For Kio, "architecture is art and science. You want to bring in something that will make you feel good. This X Factor is something that the architect is expected to bring." By tuning into the industrial scrap in the region, Kio is giving the old X Factor appeal.

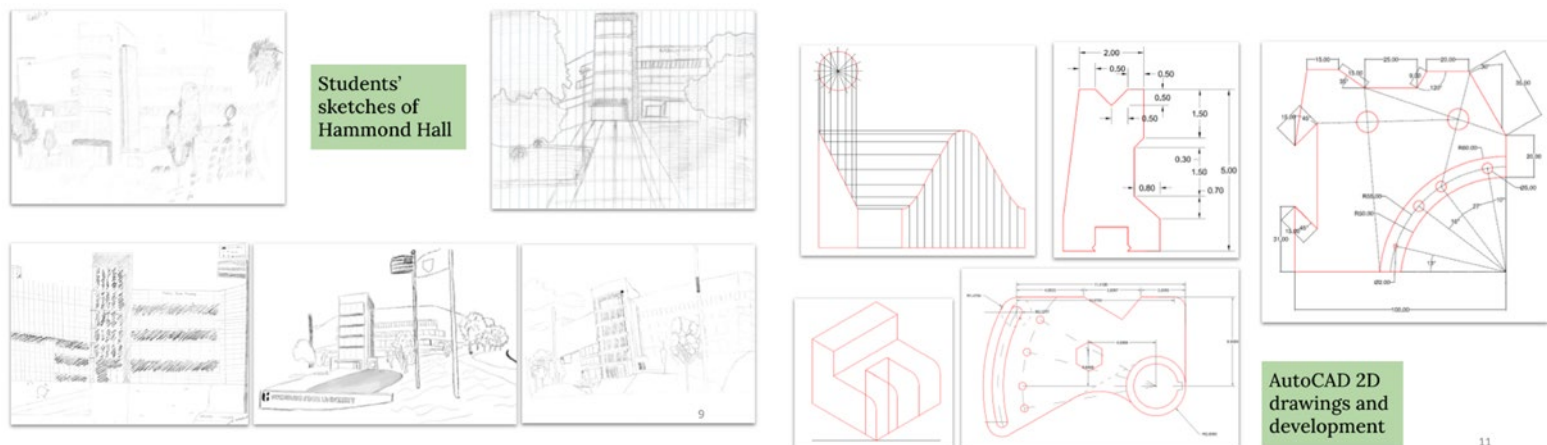


Figure 1: Sketches and drawings of students in the Engineering Graphics course.



Figure 2: a) Cascade of residential building; b&c) 3D printed models of residential buildings; d) 3D printed models of Sustainable Office Buildings

# Maximizing Performance and Preventing Injuries

BY ERIC BUDD

Just before she started college, Dr. Karen Keenan had a serious injury where she fractured her back and herniated two discs. Although that injury prevented her from playing sports in college, while at UNH she discovered athletic training, which represented the perfect combination of science, medicine, and sports. After a number of years working as an athletic trainer and in some related fields, she entered the doctoral program in Rehabilitation Science: Sports Medicine and Nutrition at the University of Pittsburgh. Dr. Keenan's research focuses not only on ways to maximize performance for everyone from elite athletes, to members of the military, to senior citizens, but also on how to use that knowledge to prevent injuries.

In her research, Dr. Keenan is interested in exploring the neuromuscular characteristics that promote maximum performance. For example, by studying elite athletes, what neuromuscular qualities contribute to their success? Then, for non-elite athletes, what aspects of their training, or what muscles could be strengthened, in order to enhance their performance? Similarly, for military personnel or for those known as tactical athletes such as EMTs, how can their performance be maximized? But even more significantly, what can be learned in order to prevent injuries?

According to Keenan, the best way to prevent musculoskeletal injuries is "to prevent the first injury. We know that for all types of injuries, the strongest predictor of suffering that injury is a previous history of that injury. If you sprained your ankle, you are 2-3 times more likely to sprain your ankle again compared to someone who never sprained their ankle. In our study of Marines, we found that for lower extremity injuries, if a Marine had a history of such injuries, their likelihood of sustaining such an injury during

training was 147% greater than someone who never did." In her research, Dr. Keenan looks for modifiable characteristics that are known indicators of injury risk. Such characteristics range from muscular strength, to balance, to how someone lands while jumping or running, and more.

ACL (anterior cruciate ligament) injuries- which is an injury to one of the ligaments in the knee- are a major concern, and women are three times more likely than men to have a non-contact ACL injury (an injury where they plant their feet, then cut to turn in another direction, only to tear their ACL.) That, according to Keenan, is a "neuromuscular control injury. Women are at heightened risk because of their landing style, so if they are trained to land correctly, it significantly reduces their risk of tearing their ACL." She is really interested in exploring how sex differences impact the risk of injury. This is a sorely neglected field of research. For example, a recent review of literature found that, although women are more likely to have a concussion and tend to have worse symptomology, only 1% of all studies of concussion patients were on females only and 40% included no female participants!

Like ACL tears, concussions are a growing concern. Interestingly, while a concussion might seem like an unpreventable injury, that isn't the case. Helmets don't prevent concussions, but they do prevent catastrophic brain injuries, skull fractures, or subdural hematomas. According to Dr. Keenan, concussions are not caused by linear force, but rather shearing force. Concussions tend to come from impact to the crown of the head, which is one of the reasons why football players are advised not to hit with their heads,



a practice referred to as spearing. There is also a connection to neck strength, where there is an inverse relationship between neck strength and the likelihood of having a concussion. That is why women and adolescents may be at increased risk of sustaining a concussion, because their necks are weaker. Thus, building up neck strength would be one way to reduce the risk of concussions. Similarly, rule changes can also help, such as the NFL's rule change on punt returns. By reducing the distance between the players on such plays, they have less time to build up momentum, so the force at impact is less. Therefore, building muscle strength, changing rules, and in general promoting proper techniques, are all ways that a seemingly unavoidable injury could be prevented.

Dr. Keenan is currently working on launching a new research project with her former colleagues at the University of Pittsburgh, and a former student, Jordan Geyster, who is now studying for a doctorate in Physical Therapy. As a student in Exercise and Sports Science, Jordan conducted a study on Heel Whip Gait Pattern, which is the amount of external or internal rotation of the lower leg after the toe leaves the ground while someone is running. Prior to Jordan's study, there had been only one published paper on the topic. In the upcoming project, they are looking at whether there is any connection between Heel Whip Gait Pattern and the risk of injury to runners. She is excited to see where this new field of research will go. Dr. Keenan's research is helping everyone from casual runners, to professional athletes, to military personnel, and everyone in between, maximize their performance and minimize the risk of serious injury.

# From Inflatables, to Fast Food, and Lots of Funny Business: The Art of Jeff Warmouth

BY ERIC BUDD

As an incoming freshman at the University of Michigan, Jeff Warmouth envisioned a future career as a doctor or a computer programmer. Fortunately for the Communications Media Department he now chairs, and for our students, as well as the art world, his life went in a completely different direction. The summer after his Freshman year, while working in Ann Arbor, Jeff stumbled upon a course in photography that ended any thought of becoming a doctor or programmer. His photography instructor not only encouraged his imagination, but also opened his eyes to ways of using photography as an expressive medium. The class was incredibly eye-opening and liberating, as it got him wondering about what else photography could do? It is that insatiable curiosity that has guided his art work ever since.

Warmouth is constantly innovating and experimenting in his art work. While pursuing his MFA at the School of the Museum of Fine Arts, he was encouraged to

experiment and explore different artistic disciplines. While photography remains at the core of his work, he draws upon a plethora of media. According to Warmouth, "I tend to explore whatever medium feels appropriate for the ideas I want to express. The idea often drives the medium as it suggests the best approach to support the idea and overall concept. In my latest exhibition, I really spent a lot of time playing with different materials, sometimes starting with a sketch where I have an initial idea how it will look, and then it changes. Sometimes I'm wandering through different mediums."

In his previous exhibition, *Urgent Blowout*, he used a series of inflatables to deconstruct himself, and our sense of identity. As Warmouth put it, "I didn't start out and say I want to experiment with inflatables. That piece came out of a couple of projects before." Similarly, in *SuperJEFFUMarket*, Warmouth turns himself into a series of supermarket products, thereby parodying our commercial society. To bring his vision

to fruition, Warmouth is constantly learning new techniques or exploring new media. For example, to construct the inflatables he had to learn how to do soft-body physics simulations, and to use a sewing machine. To make the can labels for *SuperJEFFUMarket*, he taught himself silk screening. According to Warmouth, "I love being a beginner. There is something exciting about learning new things or creating something from scratch that I like. I like to explore new things, not necessarily abandon old ones, it keeps me in beginner's mode." Running through his art is not only a passion for innovation and experimentation, but also a wonderful sense of humor. Humor helps him convey the message, and sometimes humor is the message. For Warmouth, "Humor can be about the subversion of ideas, or of language, of logic,



**CAPTION:** *SuperJEFFUMarket* installation (steel shelves, aluminum cans with custom labels, silkscreened cardboard boxes) installed at Fitchburg Art Museum for the exhibition Jeffu Warmouth: NO MORE FUNNY STUFF, 2014. Photograph by Charles Sternaimolo (FSU, 2009)

or of institutions.” Within the art world, Warmouth was influenced by the Dada movement, Surrealism, and the Fluxus movement, just to name a few, but his art also draws its inspiration from everything from the Firesign Theater, to early Mad magazine, to Monty Python, and even a course he audited on Jewish humor.

By incorporating humor into his work, Warmouth feels that it makes the work more accessible to his audience. He pokes fun at humanity, but also at himself because he appears in a lot of his work. He places himself front and center. For Warmouth, it felt kind of exploitative having actors or performers convey his ideas. (Plus he admits to being a bit of a ham.) Additionally,

Warmouth says that he “sees himself as kind of an everyman, a stand-in for humanity. The tradition of that goes back to Charlie Chaplin or Buster Keaton. They had these characters who were kind of the everyman, these schlemiels, who were clumsy, and awkward, and maybe not the best at what they do. So, leaning into that self-criticality, that self-effacement, and to be able to make fun of oneself is why I put myself in my work.” That criticality, along with a great sense of humor, an insatiable curiosity, and a passion for innovation and experimentation, have carried him a long way from that first photography class after freshman year.



**CAPTION:** Jeff Warmouth with *Jeffu Model Kit*, sculpture by Jeffu Warmouth & Ellen Wetmore (PVC, urethane & epoxy resins, paint) installed at Boston Sculptors Gallery, 2022. Photograph by Fred Levy



**CAPTION:** *Urgent Blowout*, inflatable fabric sculpture with 36 inflatable heads, 10 feet wide, installed at Boston Sculptors Gallery, 2019

# The Challenges of Listening to Others

BY ELISE TAKEHANA



While Collin Syfert did not attend medical school as he had intended at the beginning of his academic career, the impact of the many science classes he did take carried forward to his work as a rhetorician. Much of that work, especially in environmental activism and advocacy, is fueled by a frustration with the disconnect between the sciences, whose work is “largely altruistic and grounded in hard labor,” and the speedy dismissal of that work under certain social pressures. For Syfert, “many scientists and researchers believe that there’s a social contract, that they’re trying to help the world in some way. Our society funds research into what is seen as a social benefit. But despite that unspoken social contract, if the results are politically unfavorable, it’s seen as biased or easily dismissed.”

Syfert’s work in the rhetoric of science examines many branches and players from politicians, social influencers, media consumers, and scientists themselves. Ultimately, the larger goal of much of his work is to help scientists maintain credibility and effectively communicate with the broader public and hostile audiences so that their work can effect positive change in the world. This is especially challenging in a divisive political environment and in times of crisis when the general public does not necessarily grant scientists the level of credibility they once held in society, which scientists often still believe they possess. “I think of representations of scientists, and oftentimes, they’re mad scientists who fall into an archetypical Pandora’s Box metaphor. It’s always people meddling in some way for economic gain that leads to a post-apocalyptic vision of the world. Rarely is that representation

the altruistic scientist that is underpaid and overworked. A good classical mythology connection for the scientist would be Cassandra, who is able to see the future but cannot communicate it well.”

His most recent article under review grew from his last three conference presentations on the Green New Deal – one on the visual rhetoric and iconography on the WPA, one that invents a new theory on rhetorical constellation that demonstrates the flexible framework Green New Deal policy language creates, and another on a historical and political rhetorical perspective of metaphors used in ambiguous ways. According to Syfert, “that project is all about politicians and how they articulate environmentalism while drawing on this weird temporal connection to the original New Deal in World War Two mobilization conflated with retooling and rebuilding of American society to create a new vision of a sustainable future.” Although he and his collaborator are reading policy papers – many of them from economists and natural science researchers – these papers constitute political language.

The time of writing briefs and policy suggestions to politicians has lost its efficacy and now scientists have to think of how to reclaim their credibility and influence by appealing to the broader public. For Syfert, the big question is “how do you balance a perception of a disinterested academic, who is seeking truth regardless of personal gain, with that of a concerned citizen that lives in a country as a mother or father who sees what’s happening in their own work?” In this moment, Syfert argues that we need to have a deeper understanding on how the

public perceives scientists and their motivations before we can make useful recommendations for how to “bring scientific arguments into the forefront again, in public policy and in general public consciousness.”

Scientists today have a difficult rhetorical terrain to navigate. While they are used to leaning on authority appeals, their words have less universal acclaim as they believe they do. Furthermore, a sizable slice of the public believes that scientific research is self-serving, and lines the pockets of scientists supposedly eager to exploit government funding and who taut the dangers of climate change to ensure their own job security. “A consensus appeal [on the existence of climate change], for some people, just reinforces the image of a cabal of researchers plotting against the American public to absorb your tax money when, in reality, we know climate scientists are deeply distressed, trying to find funding, and trying to be heard.”

Syfert also currently has four papers out for review. “Stand Up for Science” examines how professional scientific associations talk about their social roles and obligations, which vary over time, location, and social and political contingencies. Syfert also looks to the many protests scientists held in the early months of Trump’s presidency that were directed at their own scientific organizations. “You have scientists at their annual conference, but a good chunk of them were also outside of the very same conference protesting, saying that the association needs does divest from fossil fuel

industries or stand up against immigration policies like the Muslim ban. They were calling out their own associations to stop suppressing science." Finding a public advocacy voice for a scientist is a challenging gray area, and while theoretically supported by their community in some measure, it exists without a reward structure.

Another paper, "Scientists as Rhetorical Citizens," identifies the rhetorical tactics used by scientists to persuade a hostile audience. Few scientists address a general audience and fewer still publish or talk directly to an unsympathetic audience. Here Syfert has found such a sub-set of scientists working on COVID-19 and climate change and scrutinized their discourse to determine "how right-leaning scientists address left-leaning audiences and how left-leaning scientists communicate with right-leaning audiences on their areas of specialization to try to convince and truly court them in some way."

Syfert's other two projects in progress are much more localized than the Fitchburg State community. His "Remixing Open Textbooks Through and Equity Lens" looks to compile a public speaking and general communication textbook that focuses on New England and Massachusetts in particular that

"incorporates public speaking scenarios you truly find yourself in like social media and represents demographics that better reflect our students. Since coming here, I wanted to make a direct impact with our students." The other is "They're All Liars," a collaboration with J.J. Sylvia, Viera Lovencova, Wafa Unus, Kyle Moody, and Renée Fratantonio that surveys and analyzes how students in the graduate Communications Media program got information about the pandemic, what they found credible, and how they sought out information.

At this moment, the sizable challenge scientists face is that the values of their discipline aren't necessarily shared with the general public. For instance, scientists rely heavily on the value of objectivity in their work, but a broader audience often interprets that objectivity as apathy or indecisiveness. "Scientists use language that is very accurate because in science you're not talking about truths. You're reducing uncertainty to be as close to accurate as possible. That understanding of science is not generally shared or understood by most people. Scientists work in a world where precision is a sign of doing good scholarship, but live in a public sphere filled with certainty, sound bites, and doubling down.

They're hindering themselves by relying on the same measures of decorum that give them success in the sciences but are misunderstood and not valued in political disagreements. So that becomes a difficult learning curve for a lot of researchers trying to connect with the public." Furthermore, in a public or political sphere, a scientist's audience is not other scientific experts. Their technical and scientific claims "have almost zero bearing. It's about interpersonal and dialogical connections that you make with your audience. That might seem somewhat superficial, but when audiences can't tell one argument from another, they must rely on who's the most personable, who speaks my language."

Over the horizon, Syfert is looking forward to wrapping up these five projects in process and dedicating time to a singular book project where he can build prescriptive recommendations for effective and ethical communication from the years of analytical work he has done. "I really want to do work that clearly offers suggestions and plays them out in some depth, things that could actually help people become better communicators, treat each other well, and hear one another better, reducing the polarization and the animosity we generally see out in the world."

## From the Co-Coordinator, Eric Budd and Elise Takehana



With the semester now in full swing, we hope that the CFS Research Week lightning talks (3/14) and workshops (3/16) on mental health can celebrate the research and reflection on such an important topic and give everyone a reason to pause on the day.

We're honored that so many across campus are sharing their work and time to support Research Week. Lightning talks will feature John Crawley, John Lohman,

Yang Liu, Kiernan Riley, Kori Ryan, Elizabeth Swartz, Elise Takehana, Jason Talanian, Kisha Tracy, and Heather Urbanski. Workshop leaders will include Rob Hynes, Nicolette Magone, Lauren O'Brien, Kori Ryan, Danielle Wigmore, and Mark Williams.

We are also planning a book talk to celebrate the six books and one musical album our faculty have published in this past year from Yvonne Andrews, DeMisty Bellinger-Delfeld, Katharine Covino, Amy McGlothlin, Julie Pierce, Hildur Schilling, and Kisha Tracy. Our congratulations to them on their accomplishments.

## Events

Please send details of events related to faculty research or intellectual life to [etakehan@fitchburgstate.edu](mailto:etakehan@fitchburgstate.edu) for inclusion on the Center for Faculty Scholarship's calendar and newsletter.

03 13 23

12:30 Google Meets

The Faculty Speaker Series features Patricia Kio (Engineering) in her talk "Using Deep Learning to Predict the Global Warming Potential of Renewable Energy Waste as Orient Strand Boards in USA by 2050."

03 14 23

3:30 Ellis White

CFS Spring Research Week lightning talks on "Mental Health in America" with talks from nine faculty and staff members across campus.

03 15 23

3:30 Science Lecture Hall

Dr. Pat Deegan, a thought leader in behavioral health recovery, will speak on pressing aspect of mental health.

03 16 23

2:00 Hammond Main Lounge

CFS Spring Research Week Wellness Workshops include several 30 minute workshops on relaxation, meditation, yoga, and discussion on mental health.

03 24 23

Deadline

The MSCA Professional Development funding applications for Fall 2023 projects are due to [academicaffairs@fitchburgstate.edu](mailto:academicaffairs@fitchburgstate.edu)

03 30 23

3:30 Ellis White

Dr. Elizabeth Krause shares her talk "What's Authentic? Uncommon Lessons from Made in Italy" for the Center for Italian Culture

04 03 23

12:30 Google Meets

The Faculty Speaker Series features Andrew Linscott (Peer Services) in his talk "The Evolutionary and Cognitive Science of Religion in Philosophical Perspective." <https://meet.google.com/hmv-okvb-xy>

05 01 23

12:30 Google Meets

The Faculty Speaker Series features Jennie Snow (English Studies) in her talk "Framing Guantánamo Bay Prison: Release, 'Reentry,' and Art Collaborations." <https://meet.google.com/dtn-ijtj-b-sk>

## CFS Supports Faculty-Student Research Projects

This Spring, the Center for Faculty Scholarship is supporting three Faculty-Student Research projects. Each of the students will receive a \$500 stipend, and they will work with a faculty member on a research project. Zoe-Ann Emery will be working with Dr. Wendy Keyser (English Studies) on a project entitled "Plot, Characters, and Representation: Patterns and Gaps in LGBTQ+ Children's Books." While in the past the concern was ensuring representation of the LGBTQ+ community in children's books, the publishing world has come out with numerous works to meet that need. But how varied are the stories told, and how well do they represent diversity within the LGBTQ+ community? Zoe-Ann and Dr. Keyser will be reading and coding roughly 50 children's books in their study of diversity in LGBTQ+ children's books.

Kalli J. Brassard will be doing a research project with Dr. Elyse Clark (Earth and Geographical Sciences.) Their project is entitled "Chemical and Biological Impacts of Road Salt Applications on the North Nashua River." While our relatively mild winter has lessened the use of road salt this year, the salinization of freshwater sources is a global concern due to its po-

tential impact on water quality as well as freshwater aquatic ecosystems. Their project aims to assess how much of an impact urban areas and the major roadways that cross over the Nashua River in north-central Massachusetts have on the salinization of the river.

The final faculty-student research project being supported by the CFS will be conducted by Christopher Shaddock, along with his faculty advisor Dr. Mark Williams (Behavioral Sciences.) Their project is entitled "What is your knowledge of prostate cancer, PSA testing, and screening?" Shaddock is interested in exploring the level of awareness of prostate cancer and PSA testing. This semester he will be doing a review of the literature, developing a survey on awareness of prostate cancer and PSA testing, and submitting an IRB proposal. Next fall, he'll complete his data collection and analyze his findings. Congratulations to all three students for their exciting work!

And stay tuned for an exciting announcement in our next newsletter about a new program to promote faculty-student research!

## Research Live

The Center for Faculty Scholarship

Co-Coordinator: Eric Budd and Elise Takehana

If you are interested in having your work featured in *Research Live*, contact Elise Takehana at [etakehan@fitchburgstate.edu](mailto:etakehan@fitchburgstate.edu)

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