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<td>Ulan Dakeev</td>
<td><a href="mailto:dakeev@shsu.edu">dakeev@shsu.edu</a></td>
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<td>complimentary tool for ETDD 4380 Material Handling and Plant Layout class</td>
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<td>Ryan Marek</td>
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Project Narrative

We would like to develop an android based virtual reality (VR) environment as a complimentary tool for ETDD 4380 Material Handling and Plant Layout class. The class is typically offered online, and the students do not have opportunity to engage in hands-on activities, which Engineering Technology brags about and promotes in recruitment events. This android application will be freely available to any student in class to install on their android phones/tablets and will use cost-effective VR goggles similar to Google’s cardboard to insert their phones and experience immersive VR environment. The VR environment must be developed with primitive 3D models since the phones may not have advanced computing properties. Alternatively, the project will initially be developed for the Oculus Quest 2 VR Headset with higher quality VR environment.

Methodology:

Engineering Technology’s ETDD 4380 class is offered every year, and the two contents discuss engineering economy and decision making, which the research team proposes to develop in VR. The team will conduct a comparative analysis between conventional way of material delivery and VR involved learning. The developed application will be published for the android compatible devices as an installation file (.apk), and upload to the class’s one drive, whose link will be available for students to access and download on their devices and experience the content-related VR environment.

To achieve this goal, the project targets the following two objectives:

- a) Develop a complimentary android application for ETDD 4380
- b) Collect class survey data for the developed VR content.
- c) Conduct comparative t-Test analyses for conventional vs VR supported content.

Justification:

One of the most important discussion points of engineering technology at recruitment events outside and in campus is the hands-on project-oriented learning. In this regard, the online classes, that support students with busy schedules, need contents to develop their muscle memory. We have developed similar applications during pandemic, where we replicated our Robotic Arm laboratory and let the students complete number of tasks remotely in VR, and in person. Those, who were exposed to the VR Robotic arm laboratory were able to operate the physical robotic arm in-person significantly faster and more accurate. With this motivation, we would like to test if we can provide immersive hands-on application to our remote students.

The course instructor will teach the identified chapter conventionally and will collect data for knowledge comprehension and retention, while the research group develops the proposed VR application. The students will use the proposed application to assist the course content. Newly collected data will be analyzed for independent sample t-Test for means with 95% confidence interval, develop a research manuscript, and report at local symposiums such as undergraduate research symposium, STEM Center’s Bee, GRACE Day’s symposium, or at national conferences. Additionally, the project may be used in the senior design class at Sam.
National Library Of Virtual Manipulatives (NLVM) Reimagined: Concept Apps Beta Testing, Classroom Implementation, And Revision

Project Summary

Overview

The purpose of the National Library of Virtual Manipulatives (NLVM) Reimagined: Concept Apps Beta Testing, Classroom Implementation, and Revision project is to pilot (or beta-test) and revise four virtual manipulative (VM) concept applications (apps) compatible with touch-screen devices based on the most current research on how design features contribute to mathematical learning while promoting the development of professional competencies through an experiential learning program that will a) provide pre-service and in-service elementary and secondary mathematics teachers (PST) opportunities to learn how to effectively utilize technology within their future classrooms and participate in applied research with faculty, and b) provide K-12, undergraduate, and graduate students opportunities to participate with faculty on applied research. This is the second part in an ongoing project. These apps will then be part of a larger grant funded project to re-imagine and extend all of the NLVM as a free, publicly available resource to be used across the globe.

Significance

The NLVM was an NSF supported project that began in 1999 to develop a library of uniquely interactive, web-based VMs or concept tutorials, mostly in the form of Java applets, for mathematics instruction (K-12 emphasis). The NLVM was a resource from which teachers could freely draw upon to enrich their mathematics classrooms. The materials were also important in the mathematical training of both in-service and PST across the globe. Now, over twenty years later, with the proliferation of touch-screen devices, this wonderful resource is in danger of becoming lost to future generations. The version of Java used in the initial development of the NLVM is no longer supported (See https://www.oracle.com/technetwork/java/java-se-support-roadmap.html for further insight). Furthermore, recent research has revealed the importance of certain design features within digital math apps which provides better guidance on how to design these features to be more effective (Bullock et al. 2015, 2017, 2020; Moyer-Packenham et al. 2019). Thus, it is time to reimagine the NLVM for current, widely-available touch screen devices, to update the design features to reflect the latest knowledge on effective design, and to expand the offerings for PK-16 settings. This is phase 2 of an ongoing project. In phase 1, we created four concept apps based on the work of Bullock et al. (2020). The purpose of this second phase of the project is to rigorously pilot (or, beta-test) these four apps in PK-16 mathematics classrooms, and then revise the apps to be more effective, in preparation for the next phase intended to recreate, reimagine, and expand the entire NLVM for the free use of future generations.
To
Dr. Michael T. Stephenson
Provost and Senior Vice President for Academic Affairs
Sam Houston State University, TX, USA

Dear Dr. Stephenson,

We are writing to let you know that we intend to apply for the ‘Research capacity building in life, health, and biomedical sciences' for the Building Research, Innovation, Discovery, and Growing Engagement (BRIDGE) program. SHSU is uniquely located in a rich and rapidly developing region for biomedical and health science job sectors. Our classification as R2 status demands an expansion our institutional research infrastructure. To this end, a few major challenges need to be addressed. First, there is a lack of periodic and systematic communication and collaboration among life, health, and biomedically aligned researchers scattered across SHSU campuses. Next, our students are significantly underrepresented in biomedical Ph.D. programs and underemployed in the regional Biomedical workforce despite tremendous potential. To mitigate these challenges, we propose establishing the Biomedical Research, Innovation, Training, and Employment (BRITE) consortium, which will consist of faculty members across a wide range of the life, health, and biomedical sciences, including Biology, Epidemiology, Neurotoxicology, Psychology, and Chemistry/Biochemistry. By integrating a multidisciplinary faculty pool involved in biomedical research, we aim to attain higher research capacity and productivity leading to increased funding applications and specific interventions to improve student placement into biomedical employment and graduate programs.

In the longer term, we hope to develop a centralized structure to connect biomedically aligned SHSU researchers to stimulate research collaborations and grow regional industrial partnerships to elevate the reputation and visibility of SHSU. We will also promote and develop best practices for increasing undergraduate students’ matriculation to R1 biomedical sciences graduate/Ph.D. programs and entry into the regional biomedical workforce. We will also collaborate with existing programs and centers such as the McNair Scholar’s program, STEM Center, PACE, Academic Success Center, Career Services where there are synergies in mission.

We propose to pursue the following objectives through our current BRIDGE project application:

1) We will collect preliminary data on student success and access to research and resources for future extramural grant applications, including the NIH T34 U-RISE institutional training grant and the NIH Bridges programs. It will also strengthen ties with regional partners. We will also share our biomedical research- and training-grant writing expertise in our campus community.

2) We will host research data dissemination and training events to generate local collaborations, build regional partnerships, and improve undergraduate research mentoring.

3) We will seek extramural mechanisms for continued funding the consortium’s activities. The team currently consists of four colleges and eight departments. The member of the team are:

Dr. Aaron Lynne (COSET, BIO, Professor of Microbiology, Chair) research interests include plasmid mediated antimicrobial resistance of foodborne pathogens and forensic applications of the
human microbiome. Dr. Lynne has published 33 primary research articles, 4 review articles, and 8 book chapters, and has directly mentored 12 graduate and 41 undergraduate students.  

Dr. Mardelle Atkins (COSET, BIO, Roland Black Endowed Assistant Professor Cell and Molecular Biology) studies development, tumor biology, and cancer biology using a fruitfly model. Since 2018, Dr. Atkins has supervised 37 student researchers. Her trainees have given 34 presentations at local, regional, or national meetings and won numerous awards.  

Dr. Sharmin Hasan (COSET, BIO, Assistant Professor Cell and Molecular Biology) has worked on the Wnt signaling pathway and Myosin Heavy Chain genes (MYHs) transcriptional regulation and function for the past 13 years. Dr. Hasan has mentored 19 undergraduates who have presented 10 oral/poster presentations in person at national, international, regional, and local meetings.  

Dr. Donovan Haines (COSET, CHEM, Professor and Chair) is an enzymologist specializing in P450 cytochromes and their interactions with lipids, esp. N-acylamino acids, and pharmaceuticals. He has mentored many URM students including multiple McNair Scholars. Many of his undergraduate students have gone on to graduate schools and ~10 have gone to medical school.  

Dr. David E. Thompson (COSET, CHEM, Professor, Assistant Director STEM Center) is an analytical chemist by training who investigates analytical toxicology and trace sensing. He is a co-PI on the NSF grant that has funded the STEM Center at SHSU. One of his key contributions to the STEM Centers' efforts has been the development of a Ramps-into-Research Collaboration.  

Dr. Meagan E. Hinze (COSET, CHEM, Assistant Professor) researches at the intersection of organic synthesis and biochemistry and she mentored 10 students since joining SHSU in 2019. Dr. Hinze was in the inaugural cohort of the STEM Center’s Ramps-into-Research Collaboration.  

Dr. Khalid M. Khan (COHS, PUB HEALTH, Associate Professor) investigates the neurobehavioral (NB) and mental health effects of environmental, occupational, and socioeconomic stressors in vulnerable populations with specific emphasis on children and pregnant women. He is the Principal Investigator (PI) of an ongoing NIH-funded study that examines the early-life thyroid hormone disruption induced by environmental metals and concurrently explores if such disruption has any adverse impact on brain development later in life.  

Dr. Stephen White (CHSS, PSYCH, Assistant Professor) develops, validates, and utilizes animal models of psychiatric/psychological disorders/syndromes such as pain & analgesia, addiction, and anxiety and depression. Currently, Dr. White utilizes the only patented preclinical model of treatment-resistant depression. To date, Dr. White has mentored four McNair Scholars Program students and one student in the Elliot T. Bowers Honors College through graduation.  

Dr. Alvarez (COM, PHYS and PHARM, Professor, Chair) has a long-standing interest in understanding mechanisms governing adaptive cellular responses to stressors in pulmonary endothelial cells. Dr. Alvarez is the P.I. (R01 HL118334) and has been the Director of cell culture and small animal core, a program sponsored by the NIH Core B (PO1 HL066299). Dr. Alvarez has trained 23 undergraduate students, all of whom pursued graduate education in the medical field.  

Dr. Jailenne I. Quiñones' (COM, Clinical Anatomy, Assistant Professor) research focuses on the study of undescribed human anatomical variations addressing the clinical and surgical implications of these rare phenomenon. This investigative paradigm has resulted in over 18 peer-reviewed publications and multiple awards in the past four years. Dr. Quiñones' has trained 25 medical students–underrepresented minorities and first-generation.  

On behalf of the team,  
Sharmin Hasan  
COSET, BIO, Assistant Professor Cell and Molecular Biology
It is our incredible honor to apply for the SHSU BRIDGE Program with our proposal: Texas Wellness & Education for Carceral Communities (T-WECC). Our plan of action includes working with the major provider of electronic tablets freely provided to individuals incarcerated in prisons and jails in Texas, Securus, and forming a partnership between this company and SHSU to provide free educational and mental wellness content and possibly college-credit courses. Our proposal aligns with the stated objectives of the BRIDGE program by assembling a multidisciplinary team of researchers, each contributing their unique expertise, to enhance our analysis, and assessment of this topic. Our BRIDGE project will contribute to emerging industry and societal needs of the region and Texas by addressing fundamental contemporary problems or advancing existing knowledge through translational research in the areas of: research in life, health, and resiliency and preparing for the increased demand of educational services and mental health care.

**STATEMENT OF THE ISSUE**

With approximately 122,000 residents in prison and roughly 69,610 in local/county jails. Texas houses the largest number of carceral residents in the U.S. Similar to the rest of the country, 95% of carceral residents in Texas will eventually be released. Thus, residents need pro-social, therapeutic, and educational training during their time in custody in preparation for their eventual return to Texas communities.

Although Texas’ prisons and jails have a number of programs and activities for residents, most resident time is idle. In February of 2022, the Texas Department of Criminal Justice (TDCJ) began introducing tablets (akin to iPads) to residents of several carceral facilities, with the rollout continuing today. The TDCJ tablets, provided free to residents by Securus, afford residents some free content including a library, a version of Khan Academy, religious programming, some games, and radio access. There are also monthly paid options for expanded content including movies. However, our recent data collection within two of TDCJ’s maximum security institutions suggests that residents want more out of their tablets. In over 109 interviews with residents, most noted a desire for additional free educational, nutritional, and mental wellness content. Moreover, residents expressed hope for the future ability to take college courses for credit during incarceration so they could start and/or finish a degree program during their imprisonment (outside of Windham School District—their only current option which offers mostly vocational education). Current research suggests important outcomes for tablets in carceral settings including decreased idleness and misconduct and improved reentry/reintegration, especially since most are returning to a tech-savvy society.

Current evidence (including our interviews with 69 Texas prison/jail staff) also suggests that staff largely support tablets for residents believe tablets provide activities and learning without issues related to equity.

**Potential Question**

*Can SHSU develop a partnership with Securus to provide free educational and wellness content to residents of Texas’ prisons and jails that will decrease idle time within carceral institutions, provide a community link between SHSU and carceral facilities in Texas, decrease misconduct outcomes in custody, improve reentry success, and improve SHSU enrollments?*

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OUR PROPOSED APPROACH

Given the amazing array of faculty expertise at SHSU, our interdisciplinary team of scholars will work with Securus to achieve at least the first of two goals. **Goal 1:** Offer free educational and wellness content for carceral residents via tablet through a formed SHSU / Securus partnership, thus ensuring that security needs are met and content is designed by SHSU/Texas experts. **Goal Two:** Hopefully, further that partnership to begin working to provide distance learning courses to TDCJ residents using U.S. Pell Grants for tuition, allowing TDCJ residents to partake in a number of classes/majors at SHSU via credit-earning courses pre-release. We will include pre-post questionnaires in all content to measure knowledge growth and full evaluations post-course/content to gather data about delivery, interest, instructor, and/or usefulness.

PROPOSED INTERDISCIPLINARY TEAM FROM SHSU

<table>
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<tr>
<th>Name</th>
<th>Role and Background</th>
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<tr>
<td>Danielle S. Rudes</td>
<td>Ph.D. is a Professor of Criminal Justice &amp; Criminology with a Ph.D. in Sociology from the University of California, Irvine. Dr. Rudes is an expert qualitative researcher with over 20 years of experience working with corrections agencies. Dr. Rudes has a broad grant portfolio with funding from the National Institute on Drug Abuse, the Bureau of Justice Assistance, and the National Institute of Justice. She recently published a book, <em>Surviving Solitary: Living and Working in Restricted Housing Units</em> (2022).</td>
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<tr>
<td>Elisa Toman</td>
<td>is an Assistant Professor of Criminal Justice &amp; Criminology. She received her PhD. in Criminology from the University of South Florida. She specializes in theories of punishment, trends in criminal sentencing, and individuals’ experiences with the correctional system. She has contributed to research on solitary confinement and female incarceration.</td>
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<td>Chelsey Narvey</td>
<td>is an Assistant Professor of Criminal Justice &amp; Criminology and she received her Ph.D. from the University of Texas, Dallas. She is a Canadian born, researcher focusing on corrections &amp; developmental psychopathology.</td>
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<td>Wyatt Brown</td>
<td>is an Assistant Professor of Criminal Justice &amp; Criminology and he received his Ph.D. in Criminology from the University of South Florida. He works on projects focused on understanding the disparities that emerge in the criminal justice system, with a particular focus on corrections. His interests are motivated by the expanded use of punishment and the inequalities that emerged in the past decades.</td>
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<tr>
<td>Miltonette Olivia Craig</td>
<td>is an Assistant Professor of Criminal Justice &amp; Criminology. She completed her J.D. at Georgia State University and Ph.D. at Florida State University. Her research focuses on racial disparities in policing, such as traffic stops, citizen complaints, protest responses, and fatal use of force. Her work has been published in peer-reviewed journals and she has contributed to discussions on policing in the <em>Chicago Tribune</em> and <em>Inside Higher Ed.</em></td>
</tr>
<tr>
<td>Ryan Marek</td>
<td>is an Assistant Professor of Clinical Psychology within the College of Osteopathic Medicine. Dr. Marek teaches medical students, engages in an active program of research, serves as associate and consulting editors for both medical and psychological peer-reviewed journals, and holds a practice at SHSU Physicians clinic where he conducts various psychological assessments (including pre-surgical evaluations) and therapy. Dr. Marek’s program of research is focused on understanding how psychological factors contribute to medical outcomes. He currently has over 50 peer-reviewed publications mostly focused on pre-surgical psychological evaluations and how they predict various outcomes.</td>
</tr>
<tr>
<td>Praphul Joshi</td>
<td>is an Associate Professor &amp; Coordinator of Graduate Programs in the Department of Public Health. He has worked on several projects funded through Centers for Disease Control in the field of chronic disease prevention. Over the last three years, he has led the surveillance efforts for Covid-19 in Southeast Texas. His expertise in program evaluation, data analytics, and communication are critical to the success of this project.</td>
</tr>
<tr>
<td>Meredith S. Billings</td>
<td>is an Assistant Professor in Educational Leadership in the College of Education. Her research agenda focuses on informational and financial barriers to college for low-income, first generation, and racially minoritized students. She has evaluated policies and programs that focus on college access and college affordability such as free college/promise programs, guaranteed tuition/fixed tuition plans, and college and financial aid advising in public high schools. Her work has been supported by the Spencer and Kresge Foundations. She earned a Ph.D. in higher education from the University of Michigan, M.A. in higher education from the University of Maryland, and B.S. in neuroscience from William and Mary.</td>
</tr>
<tr>
<td>Berna El Rahi</td>
<td>is an Assistant professor of nutrition at the Human Sciences Department, College of Health Sciences. She received her Ph.D. in geriatric nutrition with an emphasis on epidemiology from University of Montreal and then completed two postdoctoral fellowships, one in nutritional epidemiology at the National Health Institute of Medical Research (INSERM), University of Bordeaux, and one in nutritional geriatric psychiatry at the University of California, Los Angeles. At UCLA, Dr. Rahi was also affiliated to the Semel Institute for Neuroscience and Human Behavior, where she was a research coordinator and a health educator on several studies. Her main research focuses on the role of nutrition in successful aging and in particular the role of diet quality in physical, cognitive and mental aging. Dr. Rahi’s research is also concentrated on preventing and managing chronic diseases, frailty, and sarcopenia among older adults.</td>
</tr>
<tr>
<td>Gulden Esat</td>
<td>is an Assistant Professor in the Department of Psychology &amp; Philosophy. She is a licensed psychologist in Texas with a unique training focus on Tier 1 prevention interventions. She received her master’s degree and specialist credential from the University of Massachusetts at Amherst, which is one of the pioneer programs concentrating on systemic interventions. She ran an interdisciplinary center for eight years serving children and families to meet their mental health and educational needs. During her doctoral study, she developed Mindful Ambassadors Program, a universal well-being enhancement intervention at the University of Houston, and investigated the acceptability, feasibility, and sustainability of the program. She has experience in program evaluation and preventive mental health content development, with a focus on multicultural diversity and inclusion.</td>
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*Note:* We also asked Hyuk Cho, Professor from the Department of Computer Science, to join our team but as of this submission he has not responded. Although, there are plenty of amazing faculty in the Computer Science program, we believe Dr. Cho is an excellent fit for our team. He has experience Open Source Processing Engines such as Apache Spark, TensorFlow, and Deep Learning. His SHSU profile notes “Dr. Cho's wide-ranging expertise and versatile computing skills with 15 programming languages are indispensable for addressing challenging interdisciplinary research problems.”
Investigating the Bidirectional Relationship between COVID-19 and Opioid Use Disorder in Texas

The COVID-19 pandemic has had a profound and deleterious impact on individuals and communities globally, affecting millions of people with its wide-ranging health and societal consequences. Concurrently, the opioid epidemic persists as a critical public health concern, resulting in significant morbidity and mortality. Opioid overdose deaths rose significantly in 2021, with over 80,000 fatalities reported, marking a significant increase from the figures recorded in 2019 and 2020.

Opioid use disorder (OUD) is defined as the compulsive uncontrolled use of opioids despite harm. Recent studies suggest an association between OUD and COVID-19 pandemic. The pandemic has created a host of stressors that have intensified mental health challenges, elevating the vulnerability to substance use. Additionally, the pandemic disrupted the delivery of OUD treatments and services, resulting in reduced access to critical patient care, further increasing the risk of opioid use, relapse, and overdose deaths.

On the other hand, the opioid epidemic strained healthcare resources and aggravated the spread of COVID-19. The heightened risk of transmission can be at least partly ascribed to the risky behaviors associated with drug seeking, coupled with homelessness and incarceration within this demographic. Furthermore, opioid use has been associated with impaired immune response. Opioids, such as fentanyl and morphine, have been found to interfere with the function of macrophages, natural killer cells and T-cells, all of which play a pivotal role in the immunologic defense against viral diseases, including COVID-19. This is supported by studies suggesting that individuals with OUD may be at an increased risk of infection and worsened outcomes following COVID-19. However, little is known about the association of OUD with COVID-19 infection and disease outcomes in the State of Texas. We posit that the interplay between OUD and COVID-19 is bidirectional and mutually exacerbating. The underlying sociodemographic and immunologic factors are yet to be determined. Accordingly, this study will investigate the bidirectional relationship between OUD and COVID-19, through the following specific aims:

Specific aim #1: Determine the association of OUD with COVID-19 infection/reinfection rates, hospitalization rates, and disease outcome in the state of Texas.

To accomplish this specific aim, we will analyze electronic health records (EHR) to investigate the susceptibility and disease outcome of COVID-19 in individuals with or without OUD. In addition, we will analyze the underlying immunologic factors associated with disease outcome in these populations.

Specific aim #2: Investigate the societal and environmental factors intensified during the pandemic and their relationship with the increased prevalence of OUD.

To accomplish this specific aim, we will analyze socioeconomic and demographic data from the United States Census Bureau, and determine the correlation between different factors and the prevalence of OUD.
Research Significance

This study will highlight the complex and multifaceted relationship between OUD and COVID-19. Understanding this association and the underlying factors is critical for public health policy and practice, as it can guide tailored interventions and resource allocation to effectively manage and mitigate the challenges faced by this at-risk population.

Collaboration and Unique Expertise

Our interdisciplinary team of researchers ensures a comprehensive approach to this investigation. The collaborative research team is composed of:

**Sahar Soliman, Assistant Professor of Pharmacology.** As a licensed pharmacist and a pharmacology expert, Dr. Soliman brings extensive knowledge of the pharmacology of drugs of abuse, and opioid utilization in Texas, with an emphasis on East Texas, our area of service.

*Areas of experience include: drugs of abuse, opioids, social determinants of health.*

**Hatem Elshabrawy, Assistant Professor of Microbiology, Immunology, and Pathology.** As a microbiology/immunology expert, Dr. Elshabrawy offers a strong background in infectious diseases, with specific expertise in the pathogenesis and immune response to COVID-19.

*Areas of experience include: viral diseases, drug development, antivirals, COVID-19.*

**For the statistical analyses, we are going to use Ms. Jocelynn Robinson’s expertise, who is a SHSU Alumnus.**

Through this collaborative approach, we are confident we will produce high-quality, interdisciplinary research that will unravel the intricate relationship between OUD and COVID-19 disease. This study has the potential to make a meaningful impact on the lives of individuals affected by opioid use disorder, by informing targeted prevention and treatment strategies for this vulnerable population during the ongoing COVID-19 pandemic and beyond.
AI-based suspect sketch generator

Project Summary:

A suspect sketch, also referred to as a composite sketch, is a visual portrayal of a suspected criminal in a criminal investigation. It is typically produced by a skilled law enforcement professional or forensic artist who gathers details about the suspect's appearance through interviews with victims and witnesses. The artist then employs this information to create a drawing or computer-generated image of the suspect's facial features, hair, and other unique characteristics.

Nevertheless, the conventional process of producing a suspect sketch is time-consuming, and the accuracy of the resulting sketch is heavily reliant on the expertise of the individual producing it. Consequently, the development of an intelligent system capable of generating suspect sketches with efficiency and precision would be of significant assistance to investigators.

Our proposal outlines a few-shot training model for text-to-image generation, which is designed to generate composite sketches using natural language descriptions by eyewitnesses as input. The model is created by adapting and retraining some existing, well-trained models and adding additional features. Specifically, we include suspect descriptions, suspect photos, and suspect sketches as additional features in the training process.

Once the model is trained, it can generate several suspect sketches based on the provided eyewitness descriptions. The eyewitness then selects the sketch that most closely resembles the suspect and provides additional descriptions to refine the sketch further until a perfect result is achieved. In addition, fast rendering of detailed photo sketches can also be achieved by incorporating different visual foundation models with image-to-image translation techniques. This process allows for more accurate and efficient generation of composite sketches, ultimately aiding law enforcement in identifying and apprehending suspects in criminal cases.

Targeted Federal Grants:

- NIJ Research and Development in Forensic Science for Criminal Justice Purposes,
- BJA Office of Justice Programs Community Based Violence Intervention and Prevention Initiative,
- NSF Expanding AI Innovation through Capacity Building and Partnerships,
- NSF Secure and Trustworthy Cyberspace (SaTC),
- NSF Training-based Workforce Development for Advanced Cyberinfrastructure.

PIs/CoPIs:

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<th>First Name</th>
<th>Last Name</th>
<th>Email Address</th>
<th>Organization</th>
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<tbody>
<tr>
<td>Fan</td>
<td>Liang</td>
<td><a href="mailto:fxl027@shsu.edu">fxl027@shsu.edu</a></td>
<td>SHSU Department of Computer Science, College of Science and Engineering Technology</td>
<td>PI</td>
</tr>
<tr>
<td>Xing</td>
<td>Liu</td>
<td><a href="mailto:xxl020@shsu.edu">xxl020@shsu.edu</a></td>
<td>SHSU Department of Computer Science, College of Science and Engineering Technology</td>
<td>CoPI</td>
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<tr>
<td>Haodi Jiang</td>
<td><a href="mailto:hxj024@shsu.edu">hxj024@shsu.edu</a></td>
<td>SHSU Department of Computer Science, College of Science and Engineering Technology</td>
<td>CoPI</td>
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<tr>
<td>William Wells</td>
<td><a href="mailto:Wmw005@shsu.edu">Wmw005@shsu.edu</a></td>
<td>SHSU Department of Criminal Justice and Criminology, College of Criminal Justice</td>
<td>CoPI</td>
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<tr>
<td>Bing Zhou</td>
<td><a href="mailto:bxz003@shsu.edu">bxz003@shsu.edu</a></td>
<td>SHSU Department of Computer Science, College of Science and Engineering Technology</td>
<td>CoPI</td>
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**Interests and qualifications of team members:**

Dr. Fan Liang is an assistant professor in the department of computer science. He had both industry working experience and research efforts on the Internet of Things, cyber security, and networking areas. His research interests include effective and secure Deep Learning-Driven data analytics in IoT Systems, distributed computing in IoT, and data analysis. He has published more than 20 publications in the last 5 years.

Dr. Xing Liu is an assistant professor in the Department of Computer Science. His main research direction is the design of deep learning-based optimization strategies for cyber-physical systems such as intelligent transportation, intelligent manufacturing, and smart grid. In the past five years, he has published more than 20 papers related to deep learning and the Internet of Things.

Dr. Haodi Jiang is an Assistant Professor in the Department of Computer Science at SHSU. His research interests include machine learning, artificial intelligence, computer vision, with applications in solar physics, space weather, cybersecurity, and bioinformatics. His work has been published in high-impact journals and conferences. He has served as a reviewer for major journals and conferences.

Dr. William Wells is Director of the Center for Intelligence and Crime Analysis and a Professor in the Department of Criminal Justice and Criminology at SHSU. Dr. Wells has worked collaboratively with criminal justice system organizations in the United States and internationally since 1995. In 2021 Dr. Wells received the SHSU Award for Excellence in Scholarly and Creative Accomplishments. He is currently collaborating on projects with many different agencies, such as U.S. Attorney’s Office for the Southern District of Texas, and the Texas Commission on Jail Standards.

Dr. Bing Zhou is an Associate Professor and chair of the Department of Computer Science at Sam Houston State University. She has been actively teaching and training students in computer science and cybersecurity for more than 15 years, advising and mentoring over 100 students at all levels. Zhou is an impactful scholar, four of her journal articles are recognized as the top 1% highly cited papers by the Web of Science. Her research interests include Cybersecurity, Database Forensics, Soft Computing, and Data Mining, her research works were funded by the NSF, the NSA, DoD, and others. She has also served on the TPC for several highly ranked conferences including AAAI and IJCAI.
The BRIDGE Program  
Sam Houston State University  
Huntsville, TX 77341

Dear The BRIDGE Review Committee:

We are writing to express our interest in the research themes proposed by the BRIDGE program, particularly in the areas of health and education. We are fascinated by the challenges and opportunities that arise in these fields and we believe that our expertise and research experience can make a meaningful contribution to the sustainable BRIDGE programs that elevate the reputation of SHSU as a major contributor to new knowledge for Texas.

Our research interests and areas of expertise are listed below:

- Dr. Ki Won Seo (Ph.D. Pennsylvania State University): Health Communication, with a focus on the impact of message framing and visuals on persuasion.
- Dr. Nam Young Kim (Ph.D. Louisiana State University): Strategic Communication, specifically the effect of message appeal and ad customization on persuasion in the context of new media.

Drawing on our research interest and expertise in health communication and strategic communication, we are currently part of the Media and Delivery Team for a project with the Texas Department of State Health Services. This project has received significant funding, totaling $6,108,224.00. The “Texas COVID-19 Vaccine Education” project aims to educate the public about the importance of getting vaccinated and how it can help stop the spread of the virus, particularly COVID-19. So far, we have taken an active role in the project, including a thorough review of the existing literature and situational analysis to assess the current state of COVID-19 vaccine education in Texas. We have been closely following the recent public health campaign developments, focusing on the challenges associated with vaccine hesitancy. Our next steps involve developing a strategic communication plan that outlines how we will create strategic health campaign messages to educate the public about the importance of the vaccine and developing a storytelling approach to the health promotion campaign.

We strongly believe that strategic communication in health communication plays a pivotal role in addressing this challenge and can help improve vaccine acceptance rates. Our interest in this area has prompted us to propose new research project aimed at developing effective health communication strategies to improve diverse vaccine acceptance rates among Texans (e.g., childhood vaccination).

Sam Houston State University is an Equal Opportunity/Affirmative Action Institution
To effectively communicate the benefit of each vaccine in public health campaigns, we must tailor the message to the specific audience with personal relevance, emphasize the unique benefits, and address concerns and misinformation. By increasing understanding about vaccines, people can help dispel myths and misconceptions hindering widespread uptake. Therefore, we are interested in conducting an extensive review of existing literature on this topic (i.e., vaccine hesitancy), analyzing current US communication strategies for various vaccines promotions, conducting an experimental study to find the factors that improve people’s acceptance of the health promotion messages, and proposing the design and development of communication campaigns after testing the efficacy of the proposed message strategies in the health communication literature.

Overall, we are confident that our research experience and expertise will be valuable assets to the BRIDGE program, and we are excited to contribute to this important initiative and make a significant impact in promoting vaccine education across Texas.

We would appreciate the opportunity to discuss this letter of interest with the committee further and explore the possibility of collaborating on this project.

Thank you for your consideration.

Sincerely,

**PI:** Ki Won Seo, Ph.D.
Associate Professor of Mass Communication
Department of Mass Communication
College of Arts and Media

**CO-PI:** Nam Young Kim, Ph.D.
Associate Professor of Mass Communication
Department of Mass Communication
College of Arts and Media
**Problem Statement:** To sustain food production and rural ways of life in Texas, we need to understand: 1) how current farming practices are under pressure from climate change; and 2) the potential of emerging digital technologies to enhance the productivity and sustainability of Texas agriculture.

**Broader Impacts/Justification:** Agriculture is a key component of the Texas economy. In 2021, Texas was the 4th largest agriculture producing state in the United States (Texas Comptroller). Agriculture production varies regionally, with rice being one of the most important crops along the Upper Texas Coast. In 2022, Texas harvested 186,000 acres of rice for a total value of $207 million (NASS 2022). The most productive sections of the rice belt are Colorado, Wharton, and Matagorda Counties (the Lower Colorado Rice Counties; LCRC).

The Texas rice economy is threatened by changing climatic conditions. As rice is a water-intensive crop, it is dependent on irrigation. For the LCRC, water for rice farming comes from the Colorado River, which is managed by the Lower Colorado River Authority (LCRA). The Colorado Basin has experienced increased droughts in recent years, and water deficits in the basin are expected to get worse with climate change, as the water balance line across the U.S. (e.g., the boundary between surplus and deficit or humid east vs. arid west) has already shifted eastward from 100 degrees west longitude to 98 degrees west (Seager et al., 2018). This zone, which represents increasing aridity and water deficits, makes up a significant portion of the Colorado Basin. Combined with changing climatic conditions, urbanization and power plants in the greater Austin area and LCRA have created additional demand on the water supply of the region. Consequently, irrigation water for rice farmers has become increasingly unstable, and their share of the Colorado Basin has been reduced in recent drought years. Hence, there is an urgent need to study how to balance urban, agricultural, and energy-related water needs in the LCRC.

To continue to be a viable agriculture sector in Texas and contribute to the regional economy of the upper Texas coast, rice farmers will need to adapt to changing climatic conditions. In recent years, digital technologies have gained increasing support as tools for adapting agriculture to increasing resource scarcity. Digital technologies include a range of precision tools (e.g., soil moisture sensors, drones, and GPS) that are integrated with algorithmic management programs. Such technologies have the potential to significantly increase both the productivity and efficiency of agriculture, and thus enable farmers to produce more food with less resources.

USDA research finds that the percentage of farmers in Texas that have adopted digital technologies lags behind other agricultural regions. The adoption of digital technologies in rice is also lower than in other commodity crops, such as corn and soybeans.\(^1\) Given the water-intensive character of rice production in Texas, the use of digital technologies has the potential to help farmers maintain agricultural production as climate change impacts water supplies.

**Research Questions**
- How have historical changes in climate and water availability impacted rice production in Texas?
- How can digital technologies assist farmers in adapting to the changing climate and water landscape?
- What are the implications of such technologies for water management, economic development, and sustainability?
- What are the factors that promote and inhibit the adoption of digital technologies by rice farmers in Texas?

**Research Objectives**
- To identify the climatic and water-related pressures facing rice farming communities in TX.

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\(^1\) See the 2023 USDA ERS Report entitled “Precision Agriculture in the Digital Era: Recent Adoptions on US Farms.”
• To understand rice farmers’ perceptions of, experiences with, and capacity to adopt digital technologies.
• To identify pathways for facilitating the adoption and diffusion of digital technologies by TX rice farmers.
• To contribute to a productive and sustainable rice farming economy and ensure the economic resilience of farmers and rural communities in Texas.

Future Research and External Funding Sources
This study will function as a pilot for a larger project that undertakes a comparative analysis of how farmers of major Texas crops (cotton, corn, wheat, and rice) are being affected by changing climatic conditions. The project will focus on farmer adaptions to such changes, the capabilities of emerging digital technologies to assist Texas farmers in being productive and sustainable, and the institutional and regulatory support farmers need to adopt such technologies.

Based on the focus of this research, and the PIs’ grant experience, we foresee several possibilities for external funding sources that range from maximum awards of $650,000 to $2.5 million. These programs include: USDA AFRI (e.g., Sustainable Agricultural Systems, Agricultural Economics and Rural Communities); USDA Climate Smart; NSF Dynamics of Integrated Socio-Environmental Systems; and NSF Innovations at the Nexus of Food, Energy and Water Systems (INFEWS).

Biosketches
Ross Guida is an Associate Professor in Department of Environmental and Geosciences. He has published interdisciplinary work on climate change impacts on desert vegetation and maximizing environmental, flood risk, and socioeconomic tradeoffs in floodplains. As a participant on a multimillion-dollar NSF EPSCoR project at UNLV, he helped survey Nevada’s ranchers, farmers, and Native American tribes to understand climate change perceptions and policy support. He worked as an NSF IGERT Fellow at Southern Illinois University, and his collaborative team spent five months immersed in Central Europe to answer human-environment questions related to sustainable floodplain management along the Tisza River. At Sam, he has been a PI or Co-PI on $500,000 of funding in internal and external awards, including a three-year, $345,000 NSF GEOPAths grant and a one-year, $44,000 National Geographic Society contract.

Maki Hatanaka is a Professor in the Department of Sociology. She has extensive field research experience on sustainable agriculture governance both nationally and globally. Her work has been published in an array of academic journals, including Science, Journal of Rural Studies, Rural Sociology, World Development, and Agriculture and Human Values. She was a lead PI on a multidisciplinary USDA AFRI grant ($360,000) that examined metrics and digital technologies as emerging sustainability governance tools in crop agriculture in the United States (2017-2021). Dr. Hatanaka has been a member of multiple multidisciplinary research teams funded by the NSF and USAID.

Jason Konefal is a Professor in the Department of Sociology. His research examines the use of non-state governance mechanisms, such as standards and metrics, to facilitate sustainability transitions in US agriculture. He was a Co-PI on a recently concluded USDA AFRI grant for $360,000 entitled “Farmer Adoption and Diffusion of Sustainability Metrics and Standards in the US. Utilizing both qualitative methods and a national survey, the project analyzed the use of sustainability assessment tools in both commodity and specialty crops in the US. Dr. Konefal has published one book and edited two volumes and has published widely in leading sociology and agricultural journals, including Rural Sociology, Agriculture, and Human Values, and the Journal of Rural Studies.
Dear Distinguished Selection Committee,

Plastic in the ocean has been a rising concern for decades, with fishing and ecological concerns at a breaking point it is more important than ever to instruct teachers and their students not only in clean water advocacy but also in ways to take practical action regarding this issue.

We want to create a phone application called MerMaids Beach CleanUp where k20 students and other community members can experience a gamification of waterway clean up and wildlife observation. When users download the app and begin to self-report their cleanup, we want them to see that they are immediately become engaged in contributing to clean water through individual initiative by taking informed action. We want users to see that if they pick up even one piece of trash that they see near any body of water, that can help keep plastic and other garbage out of the ocean and way from wildlife. By working together on something that seems small, we can solve big problems.

Action items:

• Create and launch a gamified app that appeals to k20 students that motivates people to pick up inorganic litter and look for wildlife.
• We want the website and corresponding app to have:
  • Avatars and rewards like Waze https://www.waze.com/live-map/
  • A GIS system and colorful representations of the environment like Pokemon Go! https://pokemongolive.com/?hl=en
  • An animal reporting system like Seek by iNaturalist https://www.inaturalist.org/pages/seek_app but would like it to have an option to be either a picture that is uploaded, and a cartoon character of the wildlife

Primary goals of the app:

• To help users record and acknowledge the work they have done to help prevent water pollution.
• To motivate app users to continue to engage with the app wherever they are knowing that all water leads to the ocean.
  • We will incorporate events, characters, and surprises to keep users engaged with the app, helping them continue to be aware of litter and wildlife near water including tributaries.
• To encourage others to join. This could potentially lead to a new curiosity in young people that can help them grow into a profession that focuses on innovative ideas in clean water and other problem-solving systems.
• To encourage teachers and teacher candidates to use the app in their classrooms by providing a bank of ready-made lesson plans that support app usage through standards-based learning experiences.
• To help provide solid GIS evidence to impacted communities so they can find the best locations for garbage cans and recycling bins to help prevent stray trash including plastic from entering the oceans.
• To provide a tangible link for k20 people between water, litter, and wildlife.
To create partnerships with school districts and other community stakeholders (i.e. NOAA, the National Parks Service) so we can work together to find innovative solutions to water cleanup.

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<tr>
<th>Duties</th>
<th>Partner colleges</th>
<th>Collaborators</th>
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<tbody>
<tr>
<td>1. Proof of concept website</td>
<td>College of Education</td>
<td>Dr. Amber Godwin</td>
</tr>
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<td>2. Website and app development</td>
<td>College of Science and Engineering Technology</td>
<td>Dr. ABM Islam</td>
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<td>Integrated Marketing Communications</td>
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<td>3. Curriculum development</td>
<td>College of Education</td>
<td>Dr. Amber Godwin</td>
</tr>
<tr>
<td>Mindy Wiper*</td>
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<td>4. Instructional videos—pedagogical suggestions, content</td>
<td>College of Education</td>
<td>Dr. Amber Godwin</td>
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<td>CHSS</td>
<td>Dr. Frances Brandau</td>
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<td>Integrated Marketing Communications</td>
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<td>5. Marketing and Public Relations</td>
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*Non-SHSU faculty/staff, Mindy will be joining as an Experiential Learning Consultant

MerMaids Beach CleanUp supports the strategic plan by...

1. **Student Success and Student Access**
   MerMaids Beach CleanUp provides an avenue for community building and belonging, these are two components that contribute to student success.

2. **Embody a culture of excellence**
   By creating, launching, and supporting MerMaids Beach CleanUp, faculty at SHSU would be embodying a culture of excellence by doing work that is meaningful, significant, and purpose based.

3. **Elevate the reputation and visibility of SHSU**
   By following the projected timeline proposed here MerMaids Beach CleanUp could lend itself to partnerships with the Texas Education Association and National Parks Service providing a high quality, engaging, solutions-oriented app that organically reaches beyond, elevating SHSU.

4. **Expand and elevate our service to the State and beyond**
   MerMaids Beach CleanUp supports civic engagement and informed action through service, plastic and other inorganic litter cleanup around waterways.

The local impact on this is tangible because all locations of our university exist within a floodplain area. If we can provide support to get young people involved in this initiative, more people will be vigilant to the task which in turn can help prevent plastics and other garbage from drifting out to the Gulf of Mexico during the rainy season from tributary systems in our area and surrounding areas in the region. Thank you so much for your consideration.
April 1st, 2023

Dear BRIDGE Grant Review Committee,

I am writing to express my interest in applying for a grant to establish a center for emerging media. As the media landscape continues to evolve, it is crucial to create a space that fosters innovation, research, and education in emerging media technologies and practices.

Our proposed center aims to bring together academics, industry professionals, and students to collaborate on research projects, develop new media products, and provide training and educational programs to the broader community. It is expected that the emerging technologies and emerging media types will play a significant role in future development of key local industries such as oil and gas, agriculture, correctional services, forensics, biotechnology, life and health sciences, and manufacturing. The center will aim to be at the forefront of these developments. Our center will focus on several key areas, including virtual and augmented reality, interactive storytelling, and application of artificial intelligence in media production.

The center will also serve as a hub for community outreach and engagement, providing resources and opportunities for underrepresented groups to enter and excel in the emerging media industry. We will collaborate with local community organizations, and businesses to create internship programs, mentorship opportunities, and workshops to develop skills in emerging media production.

**Grant Goal**
Establish a Center for Emerging Media

**Proposed Timeline**
Academic Year 2023/2024
The first year’s efforts will focus on creating a flagship immersive media experience for the Sam Houston Memorial Museum. We will create a Virtual Reality replica of the Woodland Home, where Sam Houston and his wife lived while he was a U.S. Senator from 1846 to 1859. The immersive interactive experience will allow visitors around the world to “walk” around the house, interact with objects, and listen to narration explaining their significance and the significance of the place and its owner. Creating such immersive experience will require us to combine the talents of faculty and staff from several areas in the College of Arts Media: virtual reality interaction design, 3d design, music composition, music recording, scriptwriting, voice acting, etc.

Academic Year 2024/2025
The second year will focus on documenting the Woodland’s Home Virtual Reality experience and creating a
strong web presence for the center for emerging media. The resulting website and videos will allow us to introduce the center’s value to local stakeholders and potential future partners. Having a well documented and professionally presented flagship project will allow us to speak with with greater confidence to future industry partners and funding organizations.

Qualifications and Experience of Team Members

Wojciech Lorenc has a terminal degree in media production (MFA in Digital Filmmaking, DePaul University) and over a decade of experience in developing interactive media curriculum. He served as a coordinator of the Internet and Mobile Media concentration at Columbia College in Chicago, a coordinator of the Transmedia track at University of Hawaii, and played the key role in developing SHSU’s MA in Emerging and Social Media. He is also an award winning media maker who received several accolades for his virtual reality interactive projects.

Sachin Mudigonda has an advanced degree in media production (M.F.A. Film & Media Production, The University of Texas at Austin) and an advanced degree in software engineering (M.S. Software Engineering, Arizona State University). Additionally, Professor Mudigonda’s creative work is well regarded internationally.

Our team consists of experienced researchers and practitioners in emerging media, as well as community stakeholders. Derrick Birdsall, the director of the Sam Houston Memorial Museum, is excited to partner with us on the development of the flagship VR project. With this grant, we will be able to start the journey to create a state-of-the-art facility, equipped with cutting-edge technologies and resources, to support our research, development, and education programs.

We believe that our proposed center will make a significant contribution to the field of emerging media, and we are committed to creating a space that promotes innovation, and collaboration. We thank you for considering our application, and we look forward to the opportunity to bring this project to fruition.

Sincerely,

Wojciech Lorenc
Chair
Department of Mass Communication
Sam Houston State University

Sam Houston State University is an Equal Opportunity/Affirmative Action Institution
Dear Review Committee,

Subject: Letter of Interest for the BRIDGE Program

I am writing to express my interest in submitting a proposal for the Growing Engagement (BRIDGE) program supported by the Provost Innovation Fund. Our interdisciplinary research team aims to develop novel standardization methods for comparing color change and degradation in artwork and standard samples using advanced art conservation science methods. Our research will significantly contribute to preserving and conserving artwork for future generations.

Our project consists of four sub-projects:

• P1. Study of pigments and dyes in Southwest US artwork: We will investigate the chemical makeup of colorants used in Southwest US artwork and establish a comprehensive database of their spectral properties.

• P2. Effect of light-induced fading on pigments and dyes via micro-fading tester: We will develop a novel methodology to standardize the study of colorant degradation in artwork based on molecular similarities between standard samples and artwork colorants, focusing on their degradation mechanisms.

• P3. Kinetic studies of light-induced fading on pigments and dyes: We aim to improve the understanding of the degradation process's speed at the molecular level and create predictive models for colorant degradation to simulate the overall faded appearance of the artwork.

• P4. Modeling fading of pigments and dyes from molecular structure: We will develop an imaging software incorporating colorimetric data obtained during MFT analysis to simulate the predicted overall change in sensitive artwork's appearance.

The BRIDGE program's support would enable our team to acquire the necessary resources and equipment for this research, including a Micro-fading tester (MFT). The MFT is a vital component of our proposed research, as it offers a non-destructive, accurate, and precise method for studying the degradation of colorants in various types of artwork. The MFT's innovative design allows us to analyze samples with a 0.5 mm light spot, ensuring that the integrity of the artwork is maintained throughout the testing process. With its portable nature, we can quickly test larger artifacts like wall paintings, sculptures, and maps in situ, reducing the risk of damage and saving time. The MFT is essential for completing projects P1 and P2 and supporting the analyses and interpretation of projects P3 and P4. Using MFT, we can determine the color change and degradation of artwork under investigation, conduct long exposure experiments on standard color samples, and develop novel virtual simulations of color change. This state-of-the-art technology is crucial for enhancing our understanding of artwork preservation and furthering the goals of the Growing Engagement (BRIDGE) program. This advanced instrumentation will allow us to collect and analyze essential data to support our investigation.

The acquisition of the necessary instrument for this project will have broader impacts on preserving cultural heritage artifacts and enhancing STEM education. By developing cutting-edge standardization methods, we aim to understand better and mitigate light-induced fading, a significant
threat to cultural heritage artifacts. Our research will advance scientific knowledge and innovative technologies and positively impact the Texas Association of Museums community by providing more effective solutions for conserving art and cultural heritage. Furthermore, the acquired equipment will significantly enhance STEM education in the chemistry department at SHSU, providing hands-on opportunities for students to apply their knowledge and skills in real-world applications and research projects. The state-of-the-art technology will enable students to conduct more complex experiments, develop critical thinking and problem-solving skills, and better prepare them for STEM careers. By incorporating the equipment into various undergraduate courses, we aim to create more engaging learning experiences for STEM majors at SHSU.

The project team and collaborators for this research initiative bring together a diverse and experienced group of experts in art conservation science, chemistry, and cultural heritage. The principal investigator, Dr. Adrian Villalta-Cerdas, is an Assistant Professor of Chemistry at Sam Houston State University with expertise in chemistry education. Collaborators include: Dr. Gregory Smith (The Otto N. Frenzel III Senior Conservation Scientist at the Indianapolis Museum of Art at Newfields), a renowned expert in art conservation science with extensive experience in the study of cultural heritage artifacts; Dr. Corina Rogge (Andrew W. Mellon Research Scientist at the Museum of Fine Arts, Houston and the Menil Collection), an expert in forensic analysis of materials, who will contribute valuable insights into the degradation mechanisms of pigments and dyes; and Derrick Birdsall (Director of the Sam Houston Memorial Museum), and Michael Sproat (curator of collections at the Sam Houston Memorial Museum) both are curatorial and historical experts in Texas. The project will also involve master's and undergraduate students from the Department of Chemistry at SHSU, who will have the opportunity to gain hands-on experience in cutting-edge research while working alongside these experienced professionals.

We are confident that our project will provide valuable insights and guidelines for art conservators and conservation scientists, improve the selection of standards for comparing artwork colorants, and enhance the preservation of cultural heritage. The interdisciplinary nature of our project combines expertise from chemistry, conservation science, and computational modeling, making it an excellent fit for the Growing Engagement (BRIDGE) program.

We look forward to submitting a full proposal for the Provost Innovation Fund’s consideration and are eager to answer any questions or provide additional information as needed. Thank you for considering our Letter of Interest, and we hope to contribute to the success of the Growing Engagement (BRIDGE) program.

Sincerely,

Dr. Adrian Villalta-Cerdas
Assistant Professor of Chemistry
Sam Houston State University
Email: axv067@shsu.edu
I am writing to express my deep interest in the issue of sand erosion in South Padre Island. As an environmental enthusiast, I am deeply concerned about the devastating impact that this problem is having on the island’s fragile ecosystem. South Padre Island is a beautiful destination that attracts many tourists every year. However, the island is facing a significant threat from sand erosion caused by natural and human factors. This erosion has already led to the loss of several beaches, which has had a significant economic impact on the island’s tourism industry. I want to use the medium of Virtual Reality to document this issue and potentially have a museum installation.

To blur and challenge the viewers’ perceptions & sensations and make them experience the erosion sensory way, we must break the conventional 2D format and take on a wholly immersive form of storytelling, i.e., Stereoscopic VR. In a virtual space, the viewer is placed within the story; characters appear beside you, and a real sense of proximity is established. Conditioned by the ability of new media to overcome boundaries and distances, audiences want to hear from people directly affected to experience their worlds as much as possible. Whether the topic is sanitation, global warming, or human trafficking, virtual reality has an impact like no other medium. At the heart of what we’re doing is a firm belief that technology and good storytelling have the power to change lives.

I also intend to explore data visualization and archival photos/footage of the aftermath of the erosion disasters on this island - making the viewers have a more visceral relationship with what is usually just a rational engagement with numbers and figures. For this, I would like to collaborate with Prof. Ava Fujimoto-Strait from the Department of Environmental and Geosciences at Sam Houston State University. Considering her geography and soil erosion expertise, she would be a tremendous collaborator in bringing the scientific lens to my artistic vision for this project.

Example use of Data Visualization with Archival Material in VR

Still from “The Day the World Changed” - Created by Gabo Arora
By creating a virtual reality installation that allows viewers to experience the effects of sand erosion firsthand, we can help educate people about this issue's urgency and the need for action. The installation could use a combination of footage from the island and computer-generated imagery to create a fully immersive experience. Viewers could be taken on a virtual tour of the island, highlighting the areas impacted by sand erosion and showing the consequences of this erosion on the local ecosystem and economy.

As someone who cares deeply about the environment, I believe it is essential to address this issue. The local government and relevant stakeholders must develop a comprehensive plan to combat sand erosion in South Padre Island. This plan must consider natural and human factors contributing to erosion, including sea level rise, storms, and human activities such as construction and beach nourishment. I believe that this installation has the potential to be an essential tool for advocacy and education. By sharing the installation with policymakers, environmental groups, and the public, we can help to build support for efforts to combat sand erosion in South Padre Island.

In conclusion, I am deeply committed to finding solutions to the issue of sand erosion in South Padre Island. I believe that through collaboration and public awareness, we can preserve this island's beauty and natural diversity for generations to come.

Thank you for considering my letter of interest.

Sincerely,

Sachin Dheeraj Mudigonda
Assistant Professor, Department of Mass Communication
sxm259@shsu.edu
Subject: Letter of Interest for the BRIDGE Program

Dear Review Committee,

We are writing to express our interest in the Building Research, Innovation, Discovery, and Growing Engagement (BRIDGE) program at Sam Houston State University (SHSU). My project focuses on evaluating and improving STEM curricula in higher education to enhance student performance, retention, and mental health. This project aligns with the BRIDGE program's objectives as it would help address the solid demand to educate much-needed future STEM workers for the Texas economy. Our project would greatly benefit from the support offered.

Since 2017, Dr. Villalta-Cerdas has been actively involved in the educational data analysis for the STEM Center at SHSU, serving as a Co-Principal Investigator in the project. In this role, he has provided annual updates on student progression for 15 critical introductory science courses, including four math, four chemistry, three biology, and four physics courses. Additionally, he has monitored overall college retention and attrition rates for STEM majors at SHSU. Consequently, he is well-versed in the protocols for requesting institutional data and its reporting process.

Dr. Villalta-Cerdas' research project aims to investigate the curriculum progression of STEM majors, focusing on ten years and students who graduated from SHSU. The project will consist of three main objectives:

1. Mapping the curriculum progression of STEM majors: By analyzing the shared courses between most STEM degrees (e.g., physics, biology, mathematics, chemistry), he plans to create a comprehensive map of curriculum progression to understand challenging points in the curriculum best.

2. Analyzing "choke" points (specific courses or stages in a student's academic journey that are challenging) in the STEM degrees at SHSU: By identifying and examining courses with high failure or withdrawal rates, student feedback and evaluations, and other factors (e.g., pre-requisite and co-requisite relationships, academic performance trends), he will determine the choke points in the STEM curriculum progression. This analysis will provide valuable insights into the challenges faced by STEM students and inform potential strategies to address these issues.

3. Creating a data analytics model for identifying choke points in other degree plans: Utilizing the findings from the STEM curriculum analysis, he will develop a model for data analytics that can be applied to other degree plans with similar course progressions. This model will serve as a valuable tool for identifying choke points in various disciplines, thereby facilitating targeted interventions and support.

Dr. Haines is not traditionally a STEM education researcher but has taught in STEM for over 25 years while doing research in chemistry, biochemistry, biomedicine, and forensic science. He has been chair of the Department of Chemistry for four years, including managing the department's student success initiatives to improve success rates in some of the most challenging college courses. As such, he seeks to formally enter the fray of education research in ways that are very complementary to Dr. Villalta-Cerdas' plans:
1. Create new data analysis toolsets in R and Python specifically tailored to analyzing student success in highly-structured multi-course sequences with high course repetition. The analysis considers students taking courses at multiple institutions, including transferring from one institution to another and taking specific courses at a school where it is easier to pass the course than returning for further courses in the series and struggling. Student trajectories in these areas are extraordinarily complex, and packages tailored to those complexities can significantly assist in identifying "choke" points as above and indirect or longer-term barriers to student success.

2. Create and assess resources contextualized in chemistry content supporting Yeager's relatively new Synergistic Mindset interventions—which combine a growth mindset intervention with stress-as-enhancement training for students. The chemical basis of stress (i.e., cortisol, norepinephrine, epinephrine/adrenaline) allows abundant opportunities for content-related reinforcement of the Synergistic Mindset ideas throughout the chemistry course sequence.

Through the BRIDGE program, we hope to collaborate with other researchers at SHSU who share a similar interest in improving STEM education. The interdisciplinary nature of this project requires the expertise of individuals with different approaches to understanding and addressing the challenges in STEM curricula. As a tenure-track faculty member in the Department of Chemistry, Dr. Villalta-Cerdas has extensive experience researching STEM education and curriculum development. Initially, his research team will comprise faculty members and researchers from diverse disciplines, including chemistry, math (Dr. Taylor Martin), and computer science (Dr. Li-Jen Lester). Additionally, experts from education and psychology will be invited to participate in the project. This interdisciplinary approach will help us effectively address the complex issues surrounding STEM curricula and student success at SHSU. Dr. Villalta-Cerdas and Haines have been fortunate to work effectively on interdisciplinary teams and have good team-building and support skills. We are confident that the BRIDGE program will facilitate collaboration and team formation, leading to the development of a successful funding proposal.

Dr. Haines would additionally like to target a grant proposal aimed at helping researchers transition to STEM education research, like the NSF Building Capacity in STEM Education Research program, which accepts applications each February.

We look forward to the opportunity to submit a full proposal for the BRIDGE program and contribute to the higher educational needs of our institution.

Sincerely,

Adrian Villalta-Cerdas  
Assistant Professor of Chemistry  
Sam Houston State University  
Email: axv067@shsu.edu

Dr. Donovan C. Haines  
Professor and Chair of Chemistry  
Sam Houston State University  
Email: haines@shsu.edu
Dear BRIDGE program,

We are aware of the Provost Innovation Fund to distribute BRIDGE grants helping to support new research in education, health services, and advancing existing knowledge through transformative discoveries in industries for Texas. In a preliminary review of your mission and funding requirements, our teams’ recent Interdisciplinary research in critical VR simulation and Blood Pattern Analysis (BPA) appears to meet the criteria to submit for an additional expanding funding proposal. Therefore, we wish to be considered for one of the bridge program’s grants to be a contributor to new areas of forensic digital twins, digital fluid simulation, and neural rendering.

**Research topic**
Development of educational tools using forensic digital twins, digital fluid simulation, and neural rendering

**Research interests and questions**

The Creative XR Lab is a new Extended Media interdisciplinary collaborative effort between the Animation and Graphic Design program as part of the department of art within the College of Art and Media. The lab, made up of 4 faculty with a culmination of expertise in game design, game mechanics, modeling, VR development, has three student research assistants currently working on interdisciplinary collaboration in “Virtual Reality” (VR) research with a special interest in Digital Fluid Simulation. The purpose of this research is to explore the current state of Visual Effects concerning realistic simulation used in today’s leading Virtual Reality environments. Just in the past few years, game engines have started using computer-aided Deep Learning training methods known as Neural Rendering which have started to emerge in the development of realistic digital fluid modeling using dynamics, big data, and complex particle systems.

The forensic digital twin is one of many emerging fields offering a new way for analysts to examine crime scene patterns. Studying and analyzing crime scene patterns frequently necessitate using scientific computing methods to collect, analyze, and interpret digital evidence from digital sources to support reconstructing events in a criminal investigation.

Our effort in this proposed work is to simulate blood dynamics and bloodstains in VR. Although bloodstain pattern analysis (BPA) in forensics plays a crucial role in reconstructing the events at a crime scene, examining massive amounts of complicated blood pattern data can be fraught with error, considering the amount of blood at each crime scene and the amounts of data that is collected. We believe it is vital to look at how these two fields, forensic digital twins and XR / VR with the use of artificial intelligence (AI), Machine Learning (ML), and Deep Learning (DL) approaches, could contribute to both visual effects (VFX) and forensic analysts, particularly in crime scene investigation and reconstruction. Combining these two initiatives will reveal insight into how humans and computers learn to recognize and categorize simple patterns into complex patterns through VR Simulation. This can lead to the development of new methods and tools to aid crime scene pattern analysis through education, training, and knowledge. Similar examples of these practices are already being applied in automated facial detection and recognition as well as medical image diagnostics.

This BRIDGE grant would allow our team to expand on existing research, including collecting more user data, conducting more testing, developing additional AI practices, and building a digital resource library with a focus on digital fluid simulation of blood patterns as studied in real life by assisting forensic analysts. In addition, we aim to provide the tools and resources needed to assist individuals with forensic analyst education, acquire training, and prepare crime scene investigators for future practice in VR and forensic digital twins. Since BRIDGE is interested in awarding grants for education, health services, and programs for emerging industries in Texas, we believe this project fits your funding guidelines.
Team qualifications

Dr. Yu: The Dept of Forensic Science in CJ has been involved in digital forensics and AI since 2015. Their involvement and contributions to the proposed research topic have been demonstrated in three peer-reviewed publications, five externally and internally funded research projects, two patent publications, and four conference proceedings.

Dr. Zelbst: Pamela Zelbst is a full professor of supply chain management in the Management, Marketing and IS Dept. Her research has been heavily focused in the area of Industry 4.0 and the technologies used to create the infrastructure for self-healing supply chain. The most significant technologies are AI, digital twins, machine vision/learning, RFID, and the Industrial Internet of Things (sensors). Dr. Zelbst has two patents and over 40 peer reviewed articles.

Assistant Professor Finch: Principle Investigator of the Creative XR Lab in the College of Art with a focus on health, and humanity. He is a UX/UI designer and developer who investigates user experience through traditional and digital media. He is currently doing research in *VR-based Hydroxyurea Education for Youth with Sickle Cell Disease and their Caregivers*. As an experienced educator with over 24 years of teaching Interactive design subjects ranging from rich interactive media, web and mobile dev, game design, and UX based research. He has served as Director of a B.S. & M. S. Interactive Design and Media at Philadelphia University, helped lead a UX Vertical Studio as Assistant Professor to the Visualization Program at A&M, and is currently an Assistant Professor at SHSU teaching basic to Advanced Interactive Design.

Assistant Professor Bryson: Jonathan Bryson is an educator in the field of 3d Animation with expertise in 3d modeling and animation. This allows him to present skillsets in fluid simulations in VFX software. Jonathan is currently at SHSU in the Dept. of Art. Jonathan’s prior research projects include interdisciplinary collaborations in fluid simulation combined with motion capture of a dance performance that is currently on public display in Houston, Texas. Jonathan’s work has participated in over 30 juried exhibitions, film festivals and has had work featured on the History Channel.

Assistant Professor of Practice Rosario: David Rosario III is an educator in the field of 2D/3D art and animation. His scholarly practices and expertise lends itself toward the fields of game design, game theory, and animation. This allows him to bring knowledge of fluid simulations in both 3D and game engines such as Unreal Engine, Maya, and other VFX software to the project. David is currently at SHSU as an Assistant Professor of Practice in the Dept. of Art.

Targeted external funding sources for the research theme.
National Endowment for the Arts (NEA), National Institute of Justice, National Science Foundation.

We look forward to hearing from you regarding the application process and how we can proceed with a grant application. Do not hesitate to contact us if you have any questions. Thank you for your assistance and consideration of this request.

Sincerely,

Sherman Finch (CAM), Jorn Yu (CJ), Pamela Zelbst (COBA), Johnathan Bryson (CAM), and David Rosario III (CAM)
On behalf of an interdisciplinary team of researchers from SHSU, I am pleased to announce our intention to apply for the Building Research, Innovation, Discovery, and Growing Engagement (BRIDGE) program supported by your Innovation Fund. Our project titled “Addressing environmental, brain, and mental health risk among rural Texas farmers through risk characterization and technology-based interventions” will have a two-fold research goal:

**First**, we will characterize the risk of highly prevalent environmental exposure (e.g., noise and pesticides) and neuropsychological health vulnerability (e.g., suicide ideation, stress, depression, and neurocognitive performance) among farmers involved in relevant high-risk occupational activities using a cross-sectional epidemiological study (Phase 1).

**Second**, based on the information gathered in Phase 1, we will develop culturally-adaptable technology-based interventions using mobile health (mHealth) technology and interactive websites with educational animation to reduce the risk of the above-mentioned environmental, mental, and neuropsychological health outcomes among farmers (Phase 2).

Our interdisciplinary team believes this to be an essential project as farmers in rural Texas face an elevated risk of environmental, mental, and neurocognitive health challenges. These pressing agricultural health issues are interconnected and often associated with lack of education about occupational hazards, social and geographical isolation, vulnerable climate-related challenges such as extreme droughts or flash floods, poor access to health services, and food insecurity. Yet, there are gaps of knowledge on the associations of environmental exposures with environmental, mental, and neurocognitive outcomes. Furthermore, very little information is available regarding the feasibility and effectiveness of technology-based interventions for reducing the burden of environmental exposure and mental health challenges in farmers from rural Texas. We believe, our proposed project involving risk characterization coupled with intervention evaluation studies would help identify comprehensive, scalable, and robust mitigation strategies for this vulnerable yet economically important population in Texas and other agricultural populations in the United States.

One objective of the BRIDGE program is to “develop successful funding proposals to specific funding agencies”. We believe that we have a sound plan to expand and sustain our proposed translational research program on rural and agricultural health with an interdisciplinary team of researchers including Khan and Scarbrough (Public Health), Saucier (Agricultural Sciences, COSET), Marek (Clinical Psychology, COM), Basith (Engineering Technology, COSET), and Islam (Computer Science, COSET).

**Dr. Khalid Khan** is an environmental and occupational health epidemiologist with expertise in designing and evaluating technology-based health intervention programs. In his ongoing research, he is also investigating the effects of environmental toxicants on neurocognitive and mental health. He is the Principal Investigator (PI) of an ongoing five-year brain health project (5R01ES032149) funded by the National Institute of Health (NIH) that is examining the effects of mixed metal exposure on brain development.

**Dr. Amanda Scarbrough** is currently working on a Department of State Health Services grant (DSHS) to assess the occupational and mental health challenges for health vulnerability
for Texas healthcare providers. Additionally, Dr. Scarbrough has worked on several grants during her time at SHSU and at the University of Texas Medical Branch (UTMB) on the effects of geographical isolation on physical and mental health.

**Dr. Ryan Saucier** is an agricultural educator interested in examining the effectiveness of low-cost interventions in mitigating health hazards and promoting personal protective equipment. Via funds from the University of Missouri, in conjunction with the faculty from the University of Iowa, previous safety research was conducted and published concerning youth exposure to ATV accidents and injuries.

**Dr. Ryan Marek** is a clinical psychologist who focuses on understanding how psychological factors contribute to medical outcomes. He is the PI on a recent grant from University of Minnesota Press (a non-profit organization) that aims to use psychological indices to predict weight loss surgery outcomes and has accumulated over 55 peer-reviewed publications in his area.

**Dr. Iftekhar Basith** has expertise in automation, technology innovation, and interactive animated learning module development. Dr. Basith was the co-PI for a recently concluded USDA grant to develop a statewide agricultural biosecurity curriculum for Texas high schools.

**Dr. ABM Rezbaul Islam** has the expertise in developing culturally adaptable interventions using mHealth technology and interactive websites. He is the PI for a project which focuses on using machine learning algorithms for psychological concepts, funded by the Association for Psychological Science and the Psychonomic Society.

We are in a unique position to conduct the proposed project as our team has both identified multiple potential external grant funding sources and has a series of external partnerships that will assist in securing additional funding. Preliminary data generated from our proposed BRIDGE project would help us strengthen several large-scale R01/R21/R15 proposals that we are planning to submit within the next two years targeting funding from the National Institute of Mental Health (NIMH), National Institute on Deafness and Other Communication Disorders (NIDCD), National Institute of Environmental Health Sciences (NIEHS), and the Department of Agriculture (DoA). We also have experience collaborating with Farm Bureau and Young Farmers groups in Texas, which will be leveraged to recruit and track study participants for this project.

We believe that the scope of the science of our project matches with at least two fundamental contemporary problems highlighted in the BRIDGE program announcement – 1) research in life, health, and biomedical sciences, and 2) preparing for the increased demand of educational services and mental health care. Thank you very much for your consideration.

Warmest regards,

Khalid M. Khan, DrPH, MEM
Associate Professor
Email: kxk051@shsu.edu
Phone: 936.294.2734
Proposed Themes:
Expand the artificial intelligence (AI) capacity at the Center for Innovation and Technology (CIT) to serve as the campus hub for collaboration on multi-disciplinary research, training, and workforce development.

Research question, topic, and problem:

Dr. Juan Daza: AI will be used to automate the species recognition process using morphology. Current taxonomic assessments are slow and are exclusively dependent on trained experts. This slow process has generated a long queue of species to be described, causing a delay in biodiversity assessments. Using AI, we expect to be pioneers in the application of machine learning methods for automated specimen-based observations. We expect to propose new morphological tools to researchers to accelerate species recognition and biodiversity estimates.

Dr. Fan Liang: Computing task offloading in industrial 4.0: In the context of Industry 4.0, computing and networking play a crucial role in supporting task processing and data transmission. However, due to the finite availability of these resources, the efficient offloading of various types of tasks to distributed computing nodes has become a significant challenge. To address this issue, artificial intelligence (AI) and deep learning algorithms are being leveraged to facilitate task offloading in industrial settings, thereby mitigating the constraints posed by computing, networking, and energy limitations.

Dr. Xing Liu: Deep learning-based control automation in IIoT: In the IIoT scenario, the configuration and control of many devices requires repetitive labor. And due to the diverse environment of IoT, these repetitive tasks need to be adjusted appropriately according to different application scenarios. Therefore, in the application scenarios of large-scale automation, it is inevitable to encounter the problem of high cost, long time and low accuracy. In order to solve this problem, we propose an automatic control scheme based on deep learning. On the one hand, the machine can generate control instructions by itself through the training of professionals. On the other hand, the device itself can re-trigger the learning mechanism to adjust the current automation algorithm according to changes in the environment.

Dr. Junkun Ma: Artificial intelligence (AI) and Machine learning (ML) will be integrated into existing and emerging next-generation automated equipment and systems for the development of intelligent manufacturing systems including warehouse operation, material handling, control and operation of collaborative robots, product inspection, assembly, testing, and packaging, etc. The goal is to develop simulated advanced manufacturing environment that enable close cooperation between humans and machines toward industry 5.0.

Dr. Jorn Yu: Develop AI from simulated events in virtual environments. Image and video-upscaling AI will be developed to enhance the quality of pattern evidence, including latent fingerprints, serial numbers, plate numbers, shoe prints, tire tracks, etc.

Dr. Pamela Zelbst: Artificial Intelligence, Enterprise Resource Planning Software, Machine Vision/Learning and other sensors will be used to research whether an integrated system of these technologies could potentially result in a self-healing supply chain. This research may be able to help identify what job skills might be needed in the future.
**Interests and qualifications of team members:**

*Dr. Juan Daza* is an associate professor in the department of Biological Sciences. His interests focus particularly on the consequences of the interplay of developmental and size constraints with functional demands, as well as the pattern of distribution across lineages. He specializes in the morphology and evolution of lizards and snakes, more particularly geckos. In his research projects, he uses High-resolution CT data of living and extinct species and surface imaging techniques (SEM, laser scanning, scientific illustrations) to describe new lifeforms and their structures. He has published more than 80 publications in peer review journals and extensive participation in conferences at the national and international level.

*Dr. Fan Liang* is an assistant professor in the department of computer science. He has both industry-working experience and research efforts on the Internet of Things, cyber security, and networking areas. His research interests include effective and secure Deep Learning-Driven data analytics in IoT Systems, distributed computing in IoT, and data analysis. In addition, his research is also related to IoT search engines and data trading. Based on his research interests, he has more than 20 publications, which include book chapters, top journal papers, and conference papers in the last 5 years.

*Dr. Xing Liu* is an assistant professor in the Department of Computer Science. In 2017, he began to engage in research related to deep learning. His main research direction is the design of deep learning-based optimization strategies for cyber-physical systems such as intelligent transportation, intelligent manufacturing, and smart grid. In the past five years, he has published more than 20 publications related to deep learning and the Internet of Things, many of which are published in top journals and international conferences.

*Dr. Junkun Ma* is a full professor in the Department of Engineering Technology. He has worked with automated manufacturing equipment and systems since joining Sam in 2016. Recently, he has been working on two externally supported projects to develop innovative devices that utilize image-processing algorithms based on machine learning (ML). A patent application was submitted in Feb. 2023 based on the results obtained with further development still in progress. Over the past five years, Dr. Ma has been supported by eight grants (five external and three internal grants) and published 21 peer-reviewed manuscripts (six journal articles and 16 conference proceedings).

*Dr. Jorn Yu* is a full professor in the Department of Forensic Science. He has been involved in machine learning (ML) and artificial intelligence (AI) research since 2015. Dr. Yu’s qualification in ML and AI related research has been demonstrated in 3 peer-reviewed publications, 5 externally and internally funded research projects, 2 patent publications, and 4 conference proceedings.

*Dr. Pamela Zelbst* is a professor of supply chain management in the Management, Marketing and Information Systems Department and Co-Director of the Center for Innovation & Technology. Her research has been heavily focused in the area of Industry 4.0 and the technologies used to create the infrastructure for *self-healing supply chain*. The most significant technologies are AI, machine vision/learning, RFID, and the Industrial Internet of Things (sensors). Dr. Zelbst has two patents and over 40 peer reviewed articles.
Building Research, Innovation, Discovery, and Growing Engagement (BRIDGE) in Health Evaluation and Data Analytics

This proposal seeks to implement a Center for Public Health Evaluation, Data Analysis, and Informatics through the BRIDGE funding opportunity at SHSU. Health evaluation, data analytics, and informatics is an emerging field in public health with immense potential for growth. This inter-disciplinary proposal is aligned with the SHSU’s strategic goals. The goals of this proposal are: 1) To establish a leadership role in public health evaluation in the North Houston area, 2) To analyze large data from regional health care systems to improve efficacy, 3) Establish a leadership role in geo-spatial analysis in public health in Southeast Texas.

Growth in overall hospitals and health care systems in North Houston area including the upcoming medical center area around The Woodlands, Conroe, and New Caney has resulted in increased need for skilled public health workforce. Increasing incidence in chronic diseases, emerging infectious diseases, and the Covid-19 pandemic have demonstrated the need for strong health information systems to include efficient data management, analytics, and improved health communications. Most health care systems gather large amounts of data every day. Over the number of years, the health care systems have been understaffed with specialists in health informatics, and most aspects of data have not been analyzed. As a result, many aspects of health care – including best practices, efficacy of care, access to health care, and evaluation of health care delivery system have huge potential to be analyzed. Diversity of data entry processes, information portals, insurance/payment systems, availability of skilled workforce, and funding necessitates uniformity in health informatics.

The College of Health Sciences is exploring the possibility of initiating clinical, research, and academic units in New Caney. A research incubator is planned in this location that will boost the presence of SHSU in the health care systems in the region. The proposed project is interdisciplinary and includes faculty across College of Health Sciences, Osteopathic medicine, and Science Engineering and Technology. The interdisciplinary team for this proposal consists of the following:

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<tr>
<th>Name</th>
<th>Expertise</th>
<th>College</th>
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<tbody>
<tr>
<td>Praphul Joshi</td>
<td>Evaluation, data analysis, and communication</td>
<td>COHS</td>
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<tr>
<td>Kevin Lord</td>
<td>Large data analysis, translational research</td>
<td>COM</td>
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<tr>
<td>Van Vung Pham</td>
<td>Data analysis, visualization, and machine learning</td>
<td>COSET</td>
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<tr>
<td>Yu Liu</td>
<td>Healthcare systems analysis</td>
<td>COHS*</td>
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<tr>
<td>Mariah Zimpfer</td>
<td>Geo-spatial analysis, health care systems</td>
<td>COHS</td>
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<td>Amanda Scarbrough</td>
<td>Healthcare systems</td>
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<td>Owen Kelly</td>
<td>Public health data in nutrition and obesity</td>
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* Subject to completion of hiring process for 2023-24 year

Implementation Strategies by Goals:

Goal 1) The team will seek extramural funding support towards establishing a center for public health evaluation from local, state, and federal public health agencies. The team will work with
local non-profits and independent requests for proposals to compete in evaluation grants. Dr. Joshi has been very successful in obtaining evaluation grants for over 20 years through various government and non-governmental agencies. Other team members have also been successful in obtaining extramural funding from healthcare systems, informatics, and communication; Goal 2) The team has established working relationships with local healthcare systems including Huntsville Memorial, Christus St. Elizabeth or Beaumont, Beaumont Baptist Hospital, Baylor College of Medicine, and other non-profit entities. The regional healthcare systems have expressed a need for large data analysis to evaluate the outcomes of certain interventions, systems integration, efficacy of healthcare, and meaningful use of data in clinical settings; Goal 3) The team has already initiated research involving GIS mapping of counties with limited access to healthcare, food deserts, high prevalence of chronic diseases, and STI’s.

The proposal seeks to accelerate the projects that are already underway in the field of large data analysis. During the last few months, the team has identified several grant opportunities that can be applied collectively as a team. Establishing a center for public health evaluation, analytics, and informatics will boost the prospects of getting funded through extramural awards. Larger universities have established centers focused on public health evaluation and informatics and have been highly successful in obtaining extra mural funding. The center will be self-sustaining in two years and will enable establishing an area of expertise that can be recognized through SHSU. The region around Huntsville, North Houston, and the larger Southeast Texas has limited presence of agencies that are skilled in this field of health informatics and analysis.

Academic Benefits: New graduate certificate program in data analytics and communication is planned to be implemented in 2023-24 year. This development of this certificate program was funded through THECB and was recognized as an emerging trend in public health. Students in the public health program can get practical experience working on data systems, obtain data management options, complete internships, and enable course development. HLTH 5378 (Health Informatics), HLTH 5376 (Biostatistics), and HLTH 5397 (Capstone) will be directly impacted by this initiative. Courses in computer science focusing on data management, information systems, and analytics will also be positively impacted by this initiative. Students in the College of Osteopathic Medicine will obtain hands on experience in understanding different health information systems, evaluate meaningful use of data in health care settings, and understand the need for program evaluation and communication.

In summary, the team is highly motivated by the BRIDGE funding opportunity and feels very positive on establishing a leadership role in Southeast Texas region in the field of health evaluation, analysis, and information systems. The diverse inter-disciplinary team can partner with experts from other areas who may benefit from the outcomes of this center. These fields include sociology, criminal justice (victim studies), human sciences (nutrition), health economics, and other related fields.

We hereby submit the Letter of Intent for the BRIDGE proposal and please let us know if you need additional information from our side. Looking forward to submitting the full proposal and making the SHSU research agenda grow to the next level.

Sincerely,

Dr. Praphul Joshi, PI, BRIDGE Public Health Evaluation, Analytics, and Informatics Team
Letter of Interest

Machine-Learning Algorithm to Optimize the Carbon Sequestration and Noise Attenuation of Roadside Vegetation in Texas

PI: Momen Mousa, Assistant Professor, Department of Engineering Technology, SHSU
Co-PI: John Pascarella, Professor, Department of Biological Science, SHSU

Problem Statement

Texas has one of the largest road networks in the United States with about 683,533 lane miles and more than 25 million registered vehicles in Texas. According to the Environmental Protection Agency (EPA), the transportation sector accounts for about 29% of total greenhouse gas (GHG) emissions in the United States contributing to global climate change. Carbon dioxide (CO₂) is the most significant greenhouse gas emitted by the transportation sector, accounting for about 82% of all transportation-related GHG emissions in the United States. One of the primary methods to reduce atmospheric CO₂ concentrations is the capture and storage of CO₂ in vegetation and soils, commonly referred to as “Carbon Sequestration.”

To address the global challenge of climate change, on January 27, 2021, President Biden signed the "Executive Order on Tackling the Climate Crisis at Home and Abroad" which included several references to carbon sequestration. The Executive Order recognizes the importance of carbon capture, utilization, and storage technologies in reducing greenhouse gas emissions and achieving a net-zero emissions economy by 2050. Specifically, the order directs federal agencies to prioritize funding for research and development to develop a plan for enhancing carbon sinks through the restoration of forests, grasslands, wetlands, and coastal habitats, which can substantially sequester carbon from the atmosphere.

In addition to carbon sequestration, roadside vegetation can better contribute to reducing outdoor noise from road traffic, in comparison to man-made material barriers. The mechanism of noise attenuation in plants is due to the capacity of leaves to absorb acoustic energy by transferring the kinetic energy which vibrates air molecules in a sound field to the vibration pattern of the leaves.

While the Texas Department of Transportation (TxDOT) reclaims land impacted by transportation infrastructure after road construction, the carbon sequestration and noise attenuation resulting from these reclamation projects are not considered in TxDOT’s decision-making process. This is primarily because little information is known about the carbon pool associated with the native and non-native species along highways in Texas. Similarly, few data have been reported on the role of plant species in Texas in noise reduction. As such, TxDOT is missing an ideal opportunity to maximize carbon capture and storage as well as noise attenuation as part of the reclamation of its roadsides after construction or resurfacing of roads. Therefore, there is an urgent need to develop a comprehensive framework that helps TxDOT, and policymakers maximize carbon sequestration and noise attenuation of different plant species along roads in Texas, which will ultimately contribute to the overall reduction of Texas’s contributions to greenhouse gases.
Objectives

The objective of the proposed project is twofold. First, quantify and maximize the carbon sequestration and noise attenuation potential provided by roadside vegetation in Texas. This study is especially important for roadsides in highly polluted zones such as those affected by heavy vehicular traffic and industries, which are common in Texas. Second, develop a machine-learning-based decision-making tool that can estimate, with superior accuracy, the carbon sequestration and noise attenuation of roadside vegetation based on plant species, plant physical properties, climate conditions, etc. This tool can be used by transportation agencies and policymakers to optimize plant choices for maximum carbon storage and noise attenuation without the need for field/lab measurements. This will ultimately help in achieving President Biden’s target of reducing greenhouse gas emissions and achieving a net-zero emissions economy by 2050.

How this Topic Relates to the Themes of the BRIDGE Program?

The results of this proposed project will maximize the carbon sequestration of roadside vegetation, which in turn will help to offset some of the carbon emissions generated by high energy demand activities such as transportation. Hence, the implementation of the results of this research will “Prepare for Demands on Energy” which is one of the themes of the BRIDGE Program.

Qualifications and Experience of Team Members

- Dr. Mousa (P.I.) received his Ph.D. in transportation engineering from Louisiana State University in 2019. His research interests include using advanced machine-learning algorithms and numerical modeling to solve critical challenges faced by the U.S. transportation infrastructure. To date, Dr. Mousa secured funding as a Principal Investigator for 13 research projects with a total budget of $1.6 million from the U.S. DOT and the NCHRP (the most prestigious grant-making agency in the U.S. in transportation engineering).
- Dr. John Pascarella’s (Co-PI) scientific research interests include plant ecology, native bee conservation, endangered species population modeling, landscape ecology, plant-insect interactions, and tropical forest dynamics.
It is an honor to be considered for the SHSU BRIDGE Program with our proposal: *Effectiveness of a Community-Based Intervention of Acceptance and Commitment Therapy for Type 2 Diabetes Management in a Rural and Underserved Community.* Our plan of action includes working with SHSU’s College of Medicine, Department of Psychology and Philosophy, Center for Community Engagement to give access to healthcare and mental health care to our rural and underserved communities who are struggling with type 2 diabetes.

We were invited to write a grant along these lines for the American Diabetes Association. Although it was positively reviewed, we were not funded due to concerns over feasibility – notably if a small, randomized control trial could be done at SHSU. A similar call for funding is occurring through NIH and we see this BRIDGE grant as an opportunity to demonstrate feasibility to larger funding agencies. This grant proposal is in line with the mechanisms of the BRIDGE grant – which is to provide applied research in health sciences and providing both educational and mental health services to the rural community with T2D. Our proposal aligns with the stated objectives of the BRIDGE program. The first theme this project aligns with is research in life, health, and biomedical sciences. The second theme this project aligns with is preparing for the increased demand of educational services and mental health care. By assembling a multidisciplinary team of researchers (physician, psychologists, nutritionist, and biologists) who all have backgrounds working with chronic disease, we could be a center point in our rural community for providing modern, evidence-based interventions to those with type 2 diabetes.

**Statement of the Issue:**
In the rural community at higher risk of diabetes, conventional lifestyle intervention approaches to diabetes management (e.g., Look AHEAD1–3) or prevention4 are not sustainable as they are resource intense. In medical deserts, there is a need for alternative strategies to care for the rural population with diabetes. One such approach is to improve diabetes self-management through Acceptance and Commitment Therapy (ACT), continuous glucose monitoring (CGM), and lifestyle education (LE). This program will move the needle by empowering individuals with diabetes to take charge of their diet and lifestyle and relying less on resources that may not always be present. This is a more sustainable and scalable approach as it requires fewer healthcare resources from the onset. ACT has provided good evidence for T2D outcomes5–8, including one study in a rural setting8. CGM has consistently shown significant glycemic benefits for people with diabetes9; however, CGM has not been assessed in the rural population. LE, which includes nutrition and physical activity, is a central component of diabetes management. Our **central hypothesis** is that a community-wide intervention of ACT with CGM and LE will improve T2D outcomes in rural communities compared to CGM and LE, or LE alone. Our goal, therefore, is to develop a scalable and sustainable program for diabetes management in rural areas that enables individual self-management and does not require extensive healthcare resources in an existing medical desert. Our primary aim is to: **Compare ACT + CGM + LE to CGM + LE, or LE alone in people with Type 2 diabetes in a rural population.** Individuals in rural communities have limited access to healthcare, more importantly, access to lifestyle intervention resources. Combining ACT with CGM and nutrition education will empower people with diabetes to make better nutrition and lifestyle choices through behavioral change and real-time feedback from their CGM device and will ultimately help with adherence to guidelines, improve diabetes outcomes and reduce complications.

**a) Research Approach**
Adults with diagnosed diabetes and with an HbA1c ≥ 6.0 at screening will be recruited in this study. Participants will be randomly assigned to one of three different groups:

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<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
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<tr>
<td>ACT, CGM, and nutrition education</td>
<td>CGM and nutrition education group</td>
<td>Control group, nutrition education only</td>
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The study will gather participants from the surrounding community, beginning with the patient population at SHSU Physicians. Our hope is to work SHSU’s Center for Community Engagement to continue to expand our reach. Based on random assignment, the intervention will consist of either a half-day education workshop (L.E.), a half-day workshop with CGM (CGM + LE), or a full day workshop with half day education, CGM, and ACT (ACT+CGM+L.E.). Each participant will have their body composition, HbA1c, CGM data, psychosocial/cognitive functioning, health literacy assessment, and food insecurity assessed at all study time points; baseline, 3-months post-intervention, and 12 months post-intervention. These timepoints will enable the assessment of short- and longer-term outcomes. A tiered reimbursement system will also be utilized to reduce attrition and promote follow-up visits. Multilevel modeling will be used to analyze data over time.

b) Expected outcomes

We expect that all intervention groups will have some improvements in outcomes (e.g., HbA1c). However, we expect the ACT + CGM + LE group to have better outcomes over time.

We expect this pilot program to move the needle on how diabetes is managed in rural areas (medical deserts) by having less reliance on local healthcare resources and empowering the individual patients for better self-management, and eventually, result in a healthier community.

Qualifications of the Study Team

The study team is highly and uniquely qualified to conduct the proposed investigation. The Co-PI, Ryan Marek, Ph.D., is an established junior investigator in obesity and bariatrics – notably in assessing how pre-surgical psychosocial factors contribute to post-surgical outcomes. He uses intensive longitudinal designs to inform his work. As a clinical psychologist, he is trained in delivering Acceptance and Commitment Therapy (ACT) for a multitude of medical disorders. He has over 50 peer-reviewed publications. Co-PI, Chelsea Ratcliff, Ph.D., has expertise in adapting and delivering mindfulness-based interventions, including ACT, to various medical populations. She is co-PI on an NIH/NCCIH award (R34AT011530-01A1) examining the feasibility of a mindfulness-based app intervention in persons with spinal cord injury and chronic pain, previously received funding from the NIH/NCI to examine a brief mindfulness intervention for women undergoing breast biopsies, and currently delivers brief ACT to patients with a variety of medical conditions including uncontrolled HIV, chronic pain, traumatic brain injury, and PTSD in the context of several NIH-funded clinical trials. Co-I, Owen Kelly, Ph.D., RNutr, brings extensive academic and industry research experience. He was the lead scientist for several clinical trials that focused on body composition (NCT02090387) and continuous glucose monitors (NCT02923960). Dr. Kelly also has a strong nutrition education background as well as previous outreach experience, and will help develop lifestyle education materials and assist with CGM data. Co-I, Oluwaseun Olaiya, DO, the study physician, has published manuscripts in several peer-reviewed journals, and has presented her scholarly work at various national and regional conferences in the area of hematology and health inequities. Co-I, Michael Griffin, Ph.D., has research expertise in obesity and diabetes and was recently awarded an NIH grant (1R15DK119792-01A1) that aims to provide insight into the molecular mechanisms leading to the expression of inflammatory chemokines and other proteins in adipocytes that may inform pharmaceutical targets in obesity and diabetes. Our medical school also has a department devoted to primary care with a fully staffed clinic targeting rural and underserved populations. Our physicians are willing to be consulted for the diagnosis of T2D in the community. Our multidisciplinary collaboration also affords us the opportunity to hire research assistants for various aspects of this project.

References:

https://myshsu.sharepoint.com/:w:/s/ADAGrant2022/EWykT8LeOIRMlfwFvcuMUuwBzlGcdubD3Jw77KbJe4FRTg?e=VlgdjY

References are also available upon request if access to the link is limited.
Stress and Trauma Among Nurses in Development (STAND) Study Letter of Intent

Post-traumatic stress disorder and other trauma-related conditions are common in Registered Nurses (RNs) and other healthcare professionals (HCPs). Symptoms of trauma in HCPs not only affect the individual but also the people they care for and the organizations where they work. Innovative solutions are needed to address trauma in HCPs to assure safe and effective care for patients. To find innovative solutions, we must first understand the experience of trauma among HCPs and their unique risk and protective factors for developing trauma-related conditions.

While some work describing the prevalence of trauma and risk/protective factors of developing trauma-related conditions has been done on practicing HCPs, very little is known about the experience of trauma among HCPs in-training. Undergraduate nursing students, for example, are exposed to many of the same traumatic events in the hospital setting as RNs, but there are no large-scale, longitudinal studies that documents this exposure, or the resulting symptoms nursing students may experience. Additionally, emerging research suggests that RNs may experience trauma outside of their professional life at a higher rate than the general population. As the effects of trauma are additive, this would make nurses particularly susceptible to experiencing negative sequela following traumatic training or work-related experiences.

Dr. Gilroy, a member of the research team, has created a Trauma-Informed Professional Development model for practicing nurses to create a learning environment in the hospital setting that is conducive to recovery after trauma exposure. The trauma-informed approach is an evidence-based tool that guides instructors through healthy ways of interacting with traumatized trainees and has also been used in higher education. A similar program can be created for undergraduate nursing students. The information collected in the proposed study will assist in identifying how and when to apply the trauma-informed training model to undergraduate nursing students by identifying the rate and timing of trauma exposure during training as well as unique risk and protective factors for trauma-related symptoms among undergraduate nursing students. This study will also assist healthcare administrators in planning for transition to practice programs with trauma in mind, creating a safer work environment for both RN’s and patients.

In 2021, we formed an interdisciplinary research team to develop a longitudinal study to assess the timing and prevalence of traumatic experiences and posttraumatic stress symptoms in nursing students as well as risk and protective factors among these studies (e.g., variables that may buffer the negative psychological effects of experiencing a traumatic event). The long-term goal of this line of research is to use the information gained from this longitudinal study to develop a trauma-informed approach to undergraduate nursing education. An IRB protocol for this study was approved in 2022, and the first wave of data collection began in Spring 2023. Undergraduate nursing students will be asked every semester to complete a survey that includes questionnaires about trauma exposure, posttraumatic stress symptoms and risk and protective factors (i.e., adverse childhood experiences, social support, self-efficacy) as well as general psychological distress and burnout.

In first wave of data (collected Spring 2023) over half (60%) of all nursing students at SHSU responded, and respondents reflected the diverse SHSU nursing student body (88% female; M age = 23; 55% White/European American; 28% Hispanic/Latino; 13% Asian American, 13% Black/African American). Results revealed high prevalence of trauma experience and high trauma-related symptom burden among nursing students. Respondents reported adverse childhood experiences (ACEs) at nearly twice the rate of the general population. Specifically, 32% of nursing students endorsed >4 ACEs, in contrast 18% of the general population endorses >4 ACEs. Importantly, >4 ACEs are associated with greatly increased risk for physical and mental health conditions. Thus, even before entering nursing school, nursing students may be at relatively high risk for trauma-related disorders. Additionally, several students (14.4%) indicated they have witnessed or participated in an activity during clinical work that
has left them feeling traumatized. Indeed, most participants (56%) reported scores above the clinical cutoff of for a provisional diagnosis of PTSD on a well-validated measure of PTSD symptom (PCL-5). Additionally, most participants (52.6%) reported scores on the Copenhagen Burnout Inventory indicative of moderate or severe burnout, which has implications for students’ mental and physical health as well as their tenure as nursing students and future HCPs. Thus, the first wave of data suggests that nursing students may be at elevated risk for trauma-related symptoms upon entering the program and that exposure to trauma is common and associated with significant symptom burden among many students.

Funding is needed to maintain a robust program of research to determine the 1) the timing and prevalence of traumatic experiences during undergraduate nursing training, 2) the association of potential risk and protective factors with the development of trauma symptoms over the course of training, and 3) the impact of traumatic experiences and trauma symptoms experienced during undergraduate nursing training on individuals transition to the workforce. These aims will be accomplished by assessing undergraduate nursing students from their first semester of nursing school into their transition to practice into the professional workforce. Data from this longitudinal study is essential to creating a map of trauma during nursing training that will help us to determine when and how to apply trauma informed professional development interventions to mitigate the psychological and professional consequences of trauma in this vulnerable population. The team is currently seeking funding for statistical support, salary support for faculty and research assistants, and incentives for participants after graduation.

The research team is made up of the following:

**Chelsea Ratcliff, PhD** is an Assistant Professor of Psychology at SHSU. She has received funding from the National Institutes of Health’s National Cancer Institute and National Center for Complementary and Integrative Health to study brief interventions to improve quality of life in diverse populations in stressful situations (i.e., patients facing cancer diagnosis and treatment and patients managing spinal cord injury and chronic pain). Additionally, Dr. Ratcliff co-leads the evaluation component of SHSU’s Bearkat Kickoff Initiative, a campus-wide effort to evaluate the emotional, social, and academic wellbeing of freshman at SHSU before and after the rollout of an enhanced freshman orientation program. Thus, she has expertise in the content area of assessing mental and emotional health as well as in developing and carrying out studies with multiple time points.

**Heidi Gilroy, PhD, RN, NPD-BC, EBP-C** is the Director of Professional Development, Magnet, and Research at Memorial Hermann The Woodlands Medical Center and a Lecturer in the College of Health Sciences. Dr. Gilroy has 18 years of experience teaching in the academic and professional development setting and more than a decade of experience in trauma research. Her previous funded research includes a 7-year longitudinal study on trauma in family violence and a qualitative study on trauma in nursing leaders.

**Devon Berry, PhD, RN** is the Director of the SHSU School of Nursing. Historically, he has conducted funded research using longitudinal and survey methodologies to explore the role of religiosity in protecting college students from emotional extremes and risky behaviors. Currently he is a member of several teams researching vaccine hesitancy. The first study is a Texas-based study is a multi-million-dollar program funded by DSHS and focuses on reducing hesitancy in the general population and healthcare providers. The second study is a multi-state survey study designed to explore the level of vaccine hesitancy in student nurses for the purpose of understanding the potential impact on the nursing workforce shortage. As an administrator and leader in nursing education for over 10 years and a researcher with experience in longitudinal and survey design, Dr. Berry brings a range of skills that will aid in the successful implementation of the STAND study.
April 1, 2023

Dear BRIDGE Committee Members,

I am Danhong Chen, an Associate Professor of Agribusiness from the School of Agricultural Sciences. I have extensive research experience in food shopping/consumption behaviors, obesity prevention, and scholarship of teaching. My work has been published in interdisciplinary journals such as American Journal of Public Health and American Journal of Health Promotion. Since joining SHSU in 2016, I have received three external grants. Two of them were interdisciplinary. In 2020, with Dr. Furjen Deng from the Sociology Department, I (as a co-PI) was awarded an external grant by the Cancer Prevention & Research Institute of Texas in the amount of $1,467,728 with the goal of building a comprehensive cancer prevention and support program among Asian-American communities in Texas. In 2022, as a Co-PI, I received a USDA grant totaling $149,801 to enhance present and future Texas farmers’ digital marketing capabilities. Dr. Rahi (co-PI) and I (PI) are expecting to get a USDA REEU grant in the amount of $362,342 in 2023. Entitled “Nurturing Researchers and Educators of Smart Food Consumption”, this project will help cultivate future agriculture teachers and researchers in nutrition education, improve food security, reduce food waste, and decrease obesity risk for high school students during their transition into adulthood.

Dr. Berna El Rahi is an Assistant Professor from the Department of Human Sciences. Her research is focused on determining the role of diet in health promotion and disease prevention in vulnerable populations. She has received a grant from the “World Food Programme” to evaluate their summer camp. Dr. Rahi’s work has been published in high impact journals such as American Journal of Clinical Nutrition, British Journal of Nutrition and Nutrients.

Through this BRIDGE program, Dr. Rahi and I would like to further our research efforts in nutrition education and obesity prevention. We will develop a grant proposal for the USDA AFRI Foundational and Applied Science (FAS) Program this summer. “For 2023, funding from FY 2024 appropriations will be used. The amount available to support the AFRI program is approximately $407,000,000, of which $300 million will be used to support AFRI FAS programs.” As the largest component of the AFRI program, the FAS program presents a
tremendous opportunity. Our grant proposal will target FAS program’s subarea of “3c. Diet, Nutrition, and the Prevention of Chronic Diseases”. The goal of this sub-program is to help prevent and control chronic disease by supporting and encouraging culturally relevant, healthy dietary choices. This objective is closely aligned with two priority areas of the BRIDGE program: Preparing for demands on food, energy, and/or water systems; Research in life, health, and biomedical sciences.

To enhance the fundability of the USDA grant proposal, we will seek an external collaborator from an R1 university (most likely Texas A&M University). As an interdisciplinary and cross-institutional team, we will design nutrition education programs targeting first-year college students to prevent Freshmen weight gain. We sincerely hope that the BRIDGE program may be used to support our research endeavor.

Sincerely,

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Research Proposal for “Navigating Reentry: The Juvenile Lifer Experience”

**PI:** Stuti S. Kokkalera, PhD; **Co-PIs:** Wyatt Brown, PhD; Erin Orrick, PhD; **Co-PI/Graduate Research Assistant:** Beatriz Amalfi Marques, PhD candidate

**Background**

The proposed study focuses on the reentry of a uniquely vulnerable population—individuals sentenced to life as juveniles. Previous research has focused almost exclusively on reentry of individuals sentenced as adults (see Western, 2018). Studies on juvenile lifers have sampled those who have already re-entered communities (see Abrams et al., 2022 as one example), without comparing them to those who are still incarcerated and preparing for release. Reentry challenges generally include locating housing, obtaining employment, securing medical care and/or counseling services, participating in educational courses, as well as reconnecting with families (Western, 2018). These challenges are exacerbated for juvenile lifer populations who are incarcerated during their adolescence and adulthood. During this time, they may have lost social support, have no employment or job history, and may not have had access or capacity to complete educational services.

We specifically do not know the extent to which juvenile lifers in Texas have been successful in navigating or preparing for reentry post-incarceration. Texas has a relatively large proportion of individuals who were under the age of eighteen when they were sentenced to life or virtual life (i.e., long terms that resemble a life sentence, e.g., 99 years in prison), with estimates ranging from 1,345 individuals (Dimas, 2022) to over 2,000 (Lauer & Dunaway, 2017). For these juvenile lifers returning or preparing to return, communities must meet the increased demand of employment skills, educational services, medical and mental health care.

**Study objectives**

The main objective is to identify the risk factors for recidivism which is defined as the commission of any new crimes while incarcerated, and/or technical (non-crime) and criminal violations of parole supervision in the last three years. A related objective is to identify roadblocks for juvenile lifers facing the possibility of release or have been re-incarcerated for re-offending. As such, there are three distinct groups: (1) the successfully paroled who have not re-offended in the last three years; (2) the unsuccessful who are yet to be released on parole after being denied, and (3) those who were released but have since returned to prison due to technical violations (e.g., not engaging in mental health care) and/or new crimes. Therefore, this exploratory study would be truly cross-comparative to distinguish the risk factors for those who have successfully navigated reentry (i.e., who have not recidivated) from those who were not successful.

**Project alignment with BRIDGE**

The proposed study is one of the first to explore the reentry experiences of the juvenile lifer population in Texas. It would contribute to growing research on how to assist the juvenile lifer population while also balancing concerns of community safety. To facilitate successful reentry for juvenile lifers, communities should provide appropriate educational and mental health services. While non-profit organizations (e.g., CrossWalk Center in Houston) provide reentry assistance, we do not know if their resources are tailored for the juvenile lifer population. To that end, findings from this proposed study can be shared with relevant reentry organizations in both urban and rural areas. Additionally, study findings can be used to develop a multi-state proposal to examine reentry concerns and challenges for juvenile lifers. The project design can also be
replicated for other marginalized incarcerated populations in Texas as well as in other states including the elderly, LGBTQ+ community, and veterans.

**Proposed Methodology**

The proposed study has been designed to parallel another project which is currently being conducted with another state department of corrections (which has requested anonymity). The proposed sample in this project are 300 individuals who were sentenced to life with parole, without parole, or to virtual life as juveniles. The 300 respondents would be grouped in to three categories (100 each): (1) those who have not been paroled from prison, (2) those who have been paroled and returned, and (3) those who have been ‘successfully’ paroled without any parole violations. Using administrative data provided by the Research & Development (R&D) Department at TDCJ, a representative sample of respondents (accounting for age, race, and other relevant demographic information) will be produced from which individuals will be contacted to complete surveys and participate in interviews. Therefore, the project will triangulate three sources: survey questionnaires, semi-structured interviews, and administrative data. This project has been conditionally approved by SHSU’s Institutional Review Board (IRB-2023-35).

**Benefits and Deliverables**

We expect to produce technical, translational reports to relevant agencies including the Texas Department of Criminal Justice (TDCJ), Correctional Management Institute of Texas (CMIT), and Association of Paroling Authorities International (APAI). Findings will be submitted to peer-reviewed academic journals. The study would shed light on how to develop age-graded reentry policies for juvenile lifer populations in Texas. Additionally, the results can be used by local non-profits in rural and urban Texas counties and other agencies who assist with juvenile lifer reentry. The research team will use the findings from this study to develop multistate proposals for external funding from the National Institute of Justice, the National Science Foundation, and other relevant foundation grants (e.g., Arnold Ventures).

**Research Team**

Dr. Kokkalera will serve as the Principal Investigator (PI). She is currently involved as a co-PI on a similarly funded project in another state. Drs. Brown and Orrick will serve as co-PIs due to their experience of working with TDCJ on other projects. Beatriz Amalfi Marques will serve as a co-PI and lead graduate research assistant. Beatriz is currently a research and development intern at TDCJ and working with TDCJ data for her dissertation (with Dr. Kokkalera as the chair of her committee). As a team, we are open to collaborating with colleagues who can assist with recognizing reentry challenges for juvenile lifers.

**References**


Issues and Regulation in the Cryptocurrency Market

In November 2022, FTX, one of the largest crypto exchanges, collapsed and filed for bankruptcy, bringing significant shocks to the entire cryptocurrency market.

When studying the reasons for its failure, a common issue has emerged: The cryptocurrency market is characterized by a lack of proper regulation and monitoring, allowing the company to misbehave and use customers’ money to engage in risky activities.

We can compare the collapse of FTX with the collapse of Enron. The Enron scandal ultimately led to introduction of the Sarbanex-Oxley Act (2002), which had a far-reaching impact on US firms. Therefore, for the stability of our financial markets, scholars must investigate the regulatory environment surrounding the cryptocurrency market. Specifically, what regulations have been missing and what mechanism can be introduced to make the market better regulated and monitored?

This proposal has the great potential to be interdisciplinary research among Finance, Business Law, and Social Studies. I look forward to expanding my proposal further in the next stage.
April 3, 2023

Dear BRIDGE Committee,

The public health risk and economic impact of mold exposures has been widely documented by the Environmental Protection Agency (EPA), and illnesses such as asthma produced through molds-produced allergens and irritants affect many people each year. In addition, certain types of mold can produce toxic compounds called mycotoxins. The degree of toxicity depends on the concentration of mold, amount of exposure, immune system function and certain genes that can increase the likelihood of an individual from developing mycotoxicosis. Air conditioning systems, which are prevalent in Texas due to the weather, provide key ingredients (moisture and temperature) that are very favorable environments for mold growth.

It is hospitals, homes, farms, and storage facilities it is helpful to detect minute traces of those fungi and to follow this trail to the locations where they are growing to facilitate remediation in support of public health. To this end, there is room for characterizing the biochemical outputs of mold such as spores, and molecules associated with mold, and for developing innovative portable detection tools to detect and track the concentration of these particles. We propose as an initial project for a mold center the development of a portable sensing device to detect and rapidly identify particles released from fungi, such as molds and mycotoxins which represent a hazard to human health, in complex matrices, such as air and dust. This proposed work aligns with the BRIDGE program goal of addressing fundamental contemporary problems in life, health, and biomedical sciences and answering societal needs of the region and Texas.

This proposal entails a unique interdisciplinary collaboration at the nexus of different fields, including analytical chemistry, nanomaterial science, microbiology, computer science (data modelling), among others, and therefore requires researchers with diverse backgrounds, skills, and knowledge. While Drs. Thompson and Monjardez both have an analytical chemistry background, their current areas of expertise and disciplines in which they apply it differ widely. There is rich potential for growth of the collaboration with other faculty members at SHSU and we would
welcome the opportunity to collaborate with Drs. Aaron Lynn and Todd Primm from the department of Biological Sciences, whose expertise lies in microbiology, as well as faculty members in the department of Engineering Technology concerned with designing and maintaining air conditioning systems, the department of Agricultural Sciences concerned with livestock, crop and food safety; and the department of Computer Science concerned with modeling the spread and detection of mold and related fungi; the college of health sciences with interest in fungal infections and public health. We believe that the proposed area of focus has substantial potential for future funding due to its public significance.

Thank you for your consideration of this letter of interest.

Yours Sincerely,

Geraldine Monjardez, PhD
Assistant Professor
Chemistry & Forensic Science Bldg.
1003 Bowers Blvd. Room 221C
Huntsville, TX, 77341-2525
g.monjardez@shsu.edu
(936) 294-4413

David E. Thompson, PhD
Professor, Department of Chemistry
Chemistry & Forensic Science Bldg.
1003 Bowers Blvd. Room 317E
Huntsville, TX, 77341-2525
det002@shsu.edu
(936) 294-3270
Dear B.R.I.D.G.E. Program Selection Committee,

It is an extreme honor to write this letter of interest to the Building Research, Innovation, Discovery, and Growing Engagement (B.R.I.D.G.E.) Program to present an interdisciplinary, graduate student led educational safety research project. The Center for Assessment, Research, and Educational Safety (C.A.R.E.S.) and the College of Criminal Justice are proposing a project titled *How Educators and Law Enforcement have Thwarted School Attacks and Swatting Attempts*. This 2 year, interdisciplinary, mixed-methods study will enhance the B.R.I.D.G.E. Program’s goals by addressing concerns of resiliency and preparing for increased demand for educational services by supporting the development of research for school safety and prevention of active and hoax school attacks. Please allow us to explain our study in further detail.

C.A.R.E.S. is a multi-disciplinary research center housed in the College of Education with the mission of collecting, analyzing, and disseminating high quality research on school and university safety throughout the United States. C.A.R.E.S. has led research in school shootings, natural disasters, and educators’ needs pertaining to safety since 2019. Graduate Researchers will be working alongside Dr. Matthew Fuller, Principal Investigator, and Dr. Jason Ingram for this proposed project. Dr. Fuller is Professor of Higher Education Leadership, Director of the Doctoral Program in Higher Education Leadership, and Director the C.A.R.E.S. Dr. Ingram is an Associate Professor, Graduate Program Director, and Assistant Chair for the Criminal Justice and Criminology Department with experience in research around policing and safety. Mrs. Stacie Haynes and Mrs. Jayde Casper (C.A.R.E.S. professional staff) will provide administrative leadership and support. C.A.R.E.S. Graduate Assistants Ms. Kristen Barho and Mr. Mathias Litzmann, (M.A. in Counseling Candidates) as well as Ms. Kayla Alaniz, (Ph.D. in Criminology Candidate) will lead the daily research activities. A unique facet of this proposal is that Graduate Assistants will lead this study as a part of their plans of study (possible theses or dissertations) with faculty direction, furthering all of SHSU’s strategic priorities. By supporting graduate student led research, student success and growth (priority 1) will be the focal points of this project. SHSU will enhance its reputation and visibility (priority 3) by addressing a topic of major concern for society (priority 4), all the while sustaining research agendas that have reflected a culture of excellence (priority 2) in past projects as well as the proposed project.

The proposed project would entail sending out an electronic survey to emergency management personnel at thousands of schools and universities across the country to determine how, if at all, educators and law enforcement agents have thwarted a potential school attack, and to determine how, if at all, they have responded to a hoax threat. Next, interviews will be held with participants who are willing to share stories of particular interest. Interviews will be conducted over Zoom or in person as travel funds and time allow. This study will provide the B.R.I.D.G.E. Program the opportunity to delve deeper into what can be done to prevent school attacks and how law enforcement officers and educators recognize and respond to real and hoax events. Educators with public and private institutions, police officers, and emergency responders from across the nation will be invited to participate in this study. While case studies of thwarted
school attacks have been conducted and recently shared by the National Threat Assessment Center (2019), several limitations to these studies necessitate the proposed project. First, the NTAC study covered only 41 active shooter incidents that rose to the level of Secret Service involvement. In other words, the 41 active shooter events that NTAC studied were those that were immediately impending and required levels of tactical response to disrupt the threat. This views prevention measures as purely tactical and under the purview of law enforcement. We believe a comprehensive threat assessment approach will include educators and other community members to prevent today’s threats. Moreover, the NTAC study did not include universities in its sample and included no incidents following the COVID-19 pandemic when students and communities faced new challenges and stressors. Finally, there has yet to be a comprehensive study of hoax calls or “swatting” attempts and how districts respond to them. Swatting is a harassment tactic that involves making a fraudulent 911 call to send armed emergency response teams to the victim’s location in an attempt to scare and harm the victim. This is a phenomenon that has been increasing in occurrence with the rise of internet use, and there is still little regulation around how to handle these events. These limitations warrant the proposed project as a means of providing new and proactive responses to preventing attacks on schools.

Working through staff and resources, the researchers will create and distribute a survey to thousands of current and retired educators and law enforcement agents across the country. The survey for this project will ask participants a) if they have been involved in efforts to prevent active attacks, b) if they have been the target of a hoax or “swatting” calls aimed at disrupting educational processes, c) a few attitudinal responses to questions to understand their viewpoints on educational safety, d) to describe what they are comfortable sharing about their experiences, and e) whether they would be willing to participate in a follow up interview on this topic. Using responses from the survey, researchers will then interview interested participants to gather additional qualitative data relating to the thwarting of school attacks and responding to hoax threats. Discovering how attacks on schools were successfully prevented will contribute to greater overall safety and resiliency for schools in the future. Additionally, hoax threats take up a great amount of time and resources that could be put to better use. Learning more about responding to these situations will allow for an improved use of already limited services.

The proposed project will be led by Graduate Assistants under faculty and staff direction, furthering SHSU’s commitment to student research and growth. Funding through the B.R.I.D.G.E. Program will sustain the researchers’ capacities to engage in this multi-disciplinary, multi-year project, develop a robust research effort, and disseminate findings in academic and popular press venues. A comprehensive, multi-disciplinary network of accomplished researchers at Sam Houston State University is prepared to support this research and the B.R.I.D.G.E. Program’s efforts as feasible. We anxiously await the opportunity to propose our study in greater detail and are willing to answer any questions the B.R.I.D.G.E. Program leadership may have. Together, we can inform greater school safety and use of educational services.

With gratitude,

Matthew Fuller, Ph.D.
Professor and Director, C.A.R.E.S.

Jason Ingram, Ph.D.
Associate Professor, Criminal Justice and Criminology
Work Cited

Urban Agribusiness Ventures to Connect and Engage our Hispanic Community

Problem Statement and Objectives

Urban agriculture is an emerging tool to address the BRIDGE theme of “Preparing for demands on food, energy, and/or water systems.” In recent years, urban agriculture has become one of the priorities of United States Department of Agriculture National Institute of Food and Agriculture (USDA NIFA) programs. Sam Houston State University became a Hispanic Serving Institution (HSI) in January 2022, and we are now eligible to apply for federal grants in the USDA NIFA HSI program. The negative stigma associated with agriculture and the lack of awareness about the educational and career opportunities in emerging areas of agriculture are important factors behind the diversity gap in higher education and careers in agriculture. USDA NIFA HSI programs show consistent focus on efforts to develop community service projects that engage the community and get youth interested in modern agriculture.

This proposal aims to execute a pilot project in urban agriculture in the suburbs of Houston, particularly in Hispanic communities. We will then use the connections, data, and experiences gained from the pilot project to apply for a large-scale grant from one of the USDA NIFA HSI programs. This pilot project seeks to organize a community producer group and train them in hydroponic production of fruits and vegetables. We will impart business management skills such as budgeting and marketing, with special emphasis on digital marketing. Digital marketing tools such as social media and email marketing will be incorporated as important techniques for developing a niche market for the produce. We will also develop a smartphone app for effective joint marketing by the various producers. Once the pilot project is complete, our large-scale grant application will be to establish several such producer groups and organize them to become a profitable cooperative that can sustain the production and marketing of urban agricultural products.

Proposed Project Team

The project management team will consist of six SHSU faculty members with considerable expertise and experience with various aspects of the proposal. The details on qualification and experience of the team members that will enable them to effectively execute the project are provided below.

Dr. Shyam Nair (PI): Dr. Nair is an Associate Professor of Agribusiness and the Assistant Chair of the School of Agricultural Sciences at SHSU. Dr. Nair has extensive technical and project management experience with interdisciplinary and community engagement projects. With a B.S. in Agriculture, M.S. in Agronomy, and Ph.D. in Agricultural and Applied Economics, he understands the linkages between various disciplines of agriculture. He has received external funding totaling more than $1 million as PI, and is part of more than $1.8 million of external funding as Co-PI. His expertise in project management, budgeting, resource optimization, and experience with writing federal grants will be very useful for this project. He will coordinate the project and will lead budgeting and input optimization of the production process.
**Dr. Kaitlin Hopkins (Co-PI):** Dr. Hopkins is an Assistant Professor of Plant and Soil Sciences in the School of Agricultural Sciences at SHSU. Dr. Hopkins has an interdisciplinary background stemming from her B.S. in Agriculture, M.S. in Biology-Botany, and her Ph. D in Horticulture. She has considerable expertise in hydroponics, aquaponics, and ornamental plants. Dr. Hopkins has experience in research topics focused on sustainable production of plant products and implements these in the form of experiential learning projects. Dr. Hopkins will be responsible for training the participants on hydroponics and overseeing the production activities.

**Dr. Alma Contreras-Vanegas (Co-PI):** Dr. Contreras-Vanegas is an Associate Professor in the School of Teaching and Learning at SHSU. With a B.A. in Spanish, M.A. in Bilingual Education, and Ph.D. in Educational Psychology with an emphasis on Bilingual Education, Dr. Contreras-Vanegas understands the needs of under-represented populations. Dr. Contreras-Vanegas has served as a recruiter and advisor of under-represented students at SHSU. Dr. Contreras-Vanegas will lead the community outreach activities and bilingual education part of the training.

**Dr. Mark Hainline (Co-PI):** Dr. Hainline is an Assistant Professor of Agricultural Education in the School of Agricultural Sciences at SHSU. As a former Agriculture, Food, and Natural Resources (AFNR) teacher in the Houston area, he has several close contacts that will assist the team in building collaborations with local schools. He will lead in establishing connections with area high schools and will oversee the education and communication efforts. Dr. Hainline serves as the faculty advisor of the SHSU Agricultural Ambassadors Program, which will coordinate visits and presentations at local high schools to inform and inspire high school students.

**Dr. ABM Islam (Co-PI):** Dr. Islam is an Assistant Professor of Computer Science at SHSU. Dr. Islam holds a B.S. in Computer Science and Engineering, an M.S. in Computer Engineering, and a Ph.D. in Computer Science. He has a deep understanding of the latest app development technologies and trends, and he can create high-quality apps that meet the needs of users. He is fully aware of the usability and effectiveness of various mobile app development platforms. He will be responsible for creating an app to coordinate the joint production and marketing.

**Dr. Roozbeh Irani-Kermani (Co-PI):** Dr. Irani-Kermani is an Assistant Professor of Agribusiness at SHSU with considerable expertise and experience in the areas of sales and marketing. Dr. Irani-Kermani has an MBA and a Ph.D. in Agricultural, Environmental and Regional Economics. He also has firsthand business experience as the managing director of a distribution company. He has received a USDA NIFA grant to establish a foundation for a dynamic agricultural digital marketing education initiative at SHSU by enhancing teaching, research, extension, and outreach capabilities. He will be leading marketing training for the participants with a special emphasis on digital marketing.
April 3, 2023

Chair,
Selection committee
BRIDGE program
Sam Houston State University

Dear Sir/Madam,

Re: Letter of Interest
Following the recent call for letters of interest, I write to express my interest in submitting a grant proposal to be considered for funding through the BRIDGE program.

I am an Assistant Professor in the Department of Security Studies. I have expertise in human security, environment-security nexus, governance, resource nexus, mixed methods research, and field research among others. I earned a Ph.D. in Global Governance and Human Security from the University of Massachusetts, and an M.S. in Environmental Studies from Ohio University among others. In the next couple of paragraphs, I provide a brief description of the proposed research project for which I seek funding.

Title: Building resilient communities in environmental disaster-prone areas

Principal investigator (PI): Jeremiah Ogonda Asaka

Synopsis:
Today, we live in an interdependent and interconnected world, which is also in flux. In such a world, a threat to human security anywhere is a threat to human security everywhere. In other words, as recent events including 9/11 attacks, COVID19 pandemic, and migrant crisis in Europe and the U.S. south border have shown, our safety at home and the safety of those outside our home are not mutually exclusive. Because of the interdependent and interconnected nature of our current world, we are faced with myriads of challenges some of which are wicked problems that threaten the very existence of human society as we know it today. Global environmental change is one such factor that is threatening to compromise our ability to produce enough water, energy, and food to satiate our needs. For instance, climate change is expected to increase the intensity and frequency of extreme weather events, which in turn contribute to: (i) Energy insecurity by damaging critical infrastructure such as electricity transmission lines in affected regions, (ii) food insecurity by destroying crops in the field and contributing to famine in certain places, and (iii) water insecurity by contaminating freshwater supply thereby producing water scarcity in the affected areas. On the flip side, an interdependent and interconnected world also presents us with
endless opportunities for cooperation among states, people, multinationals, and other non-state actors to address our common challenges as a humanity.

It is against such a backdrop that I am proposing to conduct a multi-year comparative study which seeks to achieve at least four things: (1) Identify and document environmental hazards in Kenya and the United States, (2) identify and document human security implications of environmental disasters in Kenya and the United States, (3) identify and document existing disaster risk reduction strategies in Kenya and the United States, and (4) examine community resilience plans in both contexts under study with a goal of identifying and documenting similarities and differences, and documenting and sharing best practices. To this end, I have purposely selected Kisumu and Texas – located in Kenya and the United States respectively – as the geographical focus of the study for five reasons: (i) Kisumu and Texas are both self-governing semi-autonomous sub-national government units led by a popularly elected governor, (ii) Kisumu and Texas border an international water body that supports a transboundary fishery, which is important to their respective local economies (i.e., Gulf of Mexico in the case of Texas, and Lake Victoria in the case of Kisumu), (iii) Kisumu and Texas have a history of environmental disasters occasioned by periodic extreme weather events including flood and drought, (iv) Kisumu and Texas are vulnerable to the effects of climate change, and (v) Kisumu and Texas are each located in a country that is party to both the United Nations Framework Convention on Climate Change and Sendai Framework on Disaster Risk Reduction.

The proposed comparative study will employ a mixed methods research design and be guided by six broad research questions as follows. (a) What environmental hazards exist in Kisumu and Texas? (b) What are the human security impacts of environmental disasters in Kisumu and Texas? (c) What policies, institutions, programs, and/or plans are in place to help reduce disaster risk and build resilient communities in Kisumu and Texas? (d) What non-state actors are actively involved in disaster risk reduction and/or resilience building work in Kisumu and Texas? (e) What challenges stand in the way of a resilient future for communities in Kisumu and Texas? (f) What opportunities exist for building resilient communities in Kisumu and Texas?

**Proposed timeline:**

<table>
<thead>
<tr>
<th>Timeframe</th>
<th>Proposed activities</th>
<th>Responsible party</th>
</tr>
</thead>
</table>
| Fall 2023 – Spring 2024 | Complete CITI program training  
Complete and submit IRB application                                                                                                                                                                                 | PI                |
| Summer 2024        | Identification of environmental hazards databases  
Environmental hazards data gathering/extraction  
Environmental hazards data analysis  
Travel to potential field sites in the United States for reconnaissance study                                                                                                                                 | PI                |
| Fall 2024 – Spring 2025 | Write and submit an article to *Environmental Hazards* journal for peer-review  
Begin working on National Science Foundation (NSF) Security and Preparedness (SAP) grant proposal                                                                                                                                 | PI                |
| Summer 2025        | Complete and submit NACOSTI research permit application  
Travel to potential field sites in Kenya for reconnaissance study  
Complete writing and submit the NSF-SAP grant proposal by August 15, 2025                                                                                                                                 | PI                |
Budget estimate:

<table>
<thead>
<tr>
<th>Item</th>
<th>Estimated cost (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI’s travel to potential field sites for reconnaissance study around the city of Houston and its environs, United States (includes ground transportation and meals)</td>
<td>500</td>
</tr>
<tr>
<td>Airfare for PI’s return trip to Nairobi</td>
<td>1,500</td>
</tr>
<tr>
<td>PI’s ground transportation, meals, and accommodation for three nights in Nairobi</td>
<td>650</td>
</tr>
<tr>
<td>NACOSTI research permit fee</td>
<td>500</td>
</tr>
<tr>
<td>PI’s travel to potential field sites for reconnaissance study around the city of Kisumu and its environs, Kenya (includes one-way airfare from Nairobi to Kisumu, ground transportation, meals, and accommodation for two weeks)</td>
<td>3,000</td>
</tr>
<tr>
<td>PI’s travel to Nairobi (includes one-way airfare from Kisumu to Nairobi, ground transportation, meals, and accommodation for three nights in Nairobi)</td>
<td>800</td>
</tr>
<tr>
<td>Stationery</td>
<td>250</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>1,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8,200</strong></td>
</tr>
</tbody>
</table>

Expected output:

If selected for funding by the BRIDGE program, this project will produce two outputs as follows: (1) A submission ready NSF research grant proposal targeted at the Security and Preparedness (SAP) award program, and (2) an article submitted to a journal such as *Environmental Hazards* for peer-review.

Considering the foregoing, I hereby submit my request of US$8,200 for your consideration. I also welcome suggestions regarding potential collaborators as well as any feedback that can improve the proposed study.

Thanks for your time and consideration.

I look forward to hearing from you.

Yours sincerely,

Jeremiah Ogonda Asaka, Ph.D.
Email: joa012@shsu.edu
Building Research, Innovation, Discovery, and Growing Engagement (BRIDGE)

As stated, priorities for the Sam Houston State University (SHSU) Strategic Plan, are as follows: 1) Student Success and Student Access, 2) Embody a Culture of Excellence, 3) Elevate the Reputation and Visibility of SHSU, 4) Expand and Elevate our Service to the State and Beyond.

Having embedded micro-credentials increases the academic agility in pre and professional health care programs by providing students short and focused credentials designed to meet work force needs within communities and regions in Texas. An example of this would be stacking credentials such as Basic Life Support (BLS), Advanced Cardiac Life Support (ACLS), and Emergency Medical Technician Basic (EMT-B). Furthermore, micro-credentials that serve pre- and professional health care students at SHSU would fulfill 3 out of 4 strategic plan priorities. Micro-credentials would allow for academic agility, promotion of career readiness into health care settings, and strengthening of the relationship with the greater SHSU community and innovative ways to serve them. Our team consists of Dr. Mary Williams, Dr. Christopher Greenleaf, and I are willing to collaborate with faculty of diverse areas of expertise to embed micro-credentialing at SHSU.

However, SHSU is in its early infancy in development of these critical credentialing offerings. Educational partnerships such as those with Montgomery County Hospital District (MCHD), Walker County EMS, Educational Service Center–Region 6, and others would allow for several micro-credentials. These micro-credentials would benefit degree plans across multiple academic programs at SHSU such as Kinesiology, Biology, Psychology, Public Health, Food Science and Nutrition, Dietetics, Music Therapy, Nursing, Education, Athletics, University Police Department, and Osteopathic Medicine, to name a few.

We look forward to teaming up with other innovative researchers at SHSU to elevate our university, its students, and the communities we serve, by providing them micro-credentialing for pre- and professional health care degree programs and via continuing education programming to the greater Gulf Coast Region focused specifically on Walker and Montgomery Counties in Texas.

Sincerely,

Mayrena Isamar Hernandez, PhD, MPH, LAT, ATC
Assistant Professor in Athletic Training
Department of Kinesiology | College of Health Sciences
Sam Houston State University
mih012@shsu.edu | 817-600-7749
sé humilde, trabaja duro, sé amable
April 3, 2023

RE: The BRIDGE Program

Dear Office of Research and Sponsored Programs,

The Honors College working in collaboration with the Academic Community Engagement (ACE) Program submits a Letter of Interest seeking BRIDGE program support. The Honors College and ACE have an established history coordinating faculty and students from across colleges to develop innovative teaching experiences, community engagement opportunities, and original research. We feel that our experience building inter-disciplinary research teams uniquely qualifies us to develop and lead faculty and students to envision and address the future societal needs of the growing East Texas region.

Our proposal is to offer a series of Honors seminars, geared to address specific emerging problems created by the increasing development and population growth of our region. An example of a seminar theme is Food and Water Security in Rural Communities. In this seminar we would recruit faculty from Biology, Agriculture, and Business with the goal of writing and submitting a USDA Agriculture and Food Research Initiative - Foundational and Applied Science Program Grant (grant cap $750,000).

Each seminar will be led by three inter-disciplinary faculty members selected to provide specific expertise to create a synergistic and collaborative research team to address societal needs. During the first half of the seminar faculty will present background lectures and readings outlining the central problem. After background material has been presented regional guest speakers representing Business, Politics, and Research will be invited to participate in a round table discussion where students can engage with them to identify community partner needs and then work to establish a reciprocal and mutually beneficial relationship. Student and faculty teams will then develop and present a proposal outlining their approach to working with the community partner to address the problem. After the course the faculty members will consolidate the ideas, and background data generated during the course. Using those data, and the established relationship with the community partner, they will collaboratively...
write and submit a grant proposal, of significant value ($500,000 and above), based on the themes addressed during the semester and the specific needs to the community partner.

Funding from the BRIDGE program will be utilized in a variety of manners. We anticipate stipends for ACE and Honors College staff to coordinate seminars, recruit faculty participates, and manage expected deliverables. To incentivize SHSU faculty to participate in a seminar that requires a grant proposal we will offer a stipend one and a half times the typical amount of an Honors Seminar. Because we envision community partners of some renown participating in our round table discussion, we anticipate having to offer an honorarium, plus expenses, to the speakers. We will also use funds to run a summer workshop where we will invite interested faculty to help develop the themes for the seminar series. We would also like to recruit the most ambitious students in the Honors Program by offering a competitive $500 scholarship to enroll in the course.

We are aware that our approach does not address a single specific topic or program, we are instead approaching the BRIDGE program as an opportunity to create a “sustainable program that elevates the reputation of SHSU” by coordinating the diverse faculty expertise of the Honors College and the community engagement pedagogy of the ACE program to create revolving teams of the best faculty, students, and community leaders to address essential problems facing the expansion of the greater east Texas region. An investment from the BRIDGE program will sustain four seminar series which will result in four sizeable grant submissions.

The Honors College and ACE have an established reputation coordinating multi-disciplinary faculty with community engagement, we believe that we can successfully pull our resources and develop a successful program that not only funds research, but also brings notoriety to Sam Houston State University.

Justin Williams, Ph. D. 
Assistant Dean Honors College

Jeffrey Wozniak, Ph. D
COSET/HONORS ACE Coordinator
BRIDGE Goal: Research in Life, health, and Biomedical sciences
Principle Investigator: Kylee Kleiner, TRIES Human pathology Manager
Partnerships: SHSU Student Health Center, EURECKA and Texas Invasive Species Institute.
Time Period: 2 years
Budget: $172,020

Scope of Work: Monitoring and maintaining the health and safety of the student population is paramount to every university system across the world, but it is also a multifaceted issue. One of the primary issues when addressing student health and safety is the cost to the university. Besides the health of a student, keeping costs for the SHSU Student Health Center (SHC) is vital to ensure free STI testing is available and keep the student’s out-of-pocket costs low. College students are exposed to a variety of pathogens ranging from COVID or influenza to gonorrhea. Sam Houston State University was unfortunately recognized in 2016 and 2018 for their exceedingly high STI rates. Furthermore, the CDC has ranked Texas #3 in congenital syphilis (561 cases) and ranked #23 and #26 for Chlamydia, Gonorrhea, and early-stage syphilis. Our initial assessment shows the SHC must use external laboratories (reference labs) to process samples collected from students, as the health center does not have the equipment nor capabilities to keep the testing in-house. Sending samples off runs a risk of costing our Health Center more which can limit their ability to continue offering free STI testing to students and reduce their sustainability within the University. Any change in their services could also reduce chances of students revisiting the health center to manage their ailment or lead to them avoiding any care, causing detriment to the surrounding student population. We propose a three-pronged approach that will assist in this increasingly important endeavor.

1) A partnership between the SHSU Student Health Center (SHC) and the TRIES Human Pathology Laboratory. The TRIES Human Pathology Laboratory would provide in-house testing for a competitive fee compared to those charged by reference labs. This partnership would be beneficial for a multitude of reasons. It would provide in-house student testing for sexually transmitted infection, such as Chlamydia, Gonorrhea, HIV, and Syphilis, with the additional optional screening for Herpes (IgG and IgM for both Type 1 and Type 2), viral hepatitis, and fecal born parasitic nematodes. In-house testing can mean more rapid results, which can reduce the risk of person-to-person spread and provide more rapid treatments. The partnership would be a symbiotic relationship for sustainability, as it will help keep costs low for the SHC but also provide consistent revenue for the TRIES Human Pathology Lab upon the conclusion of the BRIDGE funding period. Furthermore, the aid of this grant would provide a job for an early professional in molecular biology field and the funds required to renew the labs CLEA accreditation. Having a CLEA accredited lab at SHSU would provide job opportunities and a unique research space for graduate and undergraduate students that wish to gain experience running clinical health trials and accumulate laboratory experience in a team driven atmosphere.

2) Funding from this grant could support the continuation of the Wastewater Project. Since 2020, the TRIES Human Pathology Lab have collected and tested wastewater samples from sewer systems outside campus dorms. Samples were taken weekly and tested for Covid-19, and
reports were published in real-time by the end of each week. Reports were sent to campus officials to help identify and address cluster outbreaks in the campus community. However, this project will be ending this coming May and according to our data, COVID levels have not decreased. With additional funding and our established contacts with university officials, we could continue to monitor the health of the students living on campus by also screening the wastewater samples for the presence of COVID-19, meningitis, influenzas, and/or other viruses and bacteria. The tests can be adjusted based on input and concerns from campus officials. College students have a higher risk of contracting viral or bacterial infections due their classroom conditions and close quarters lifestyle. This project would also continue to provide internship and research assistant opportunities along with highly beneficial training and education for graduate and undergraduate students of SHSU.

3) Both projects would provide unique and valuable opportunities for student volunteers in the STEM and biomedical science fields. To ensure we are reaching students across campus we will also be partnering with EURECA. This collaboration will help us provide research and job opportunities to multiple students in the Human Pathology laboratory. Continuing education and hands on experience is a unique and powerful learning tool that will be offered to those working as part of this grant. To provide students with as many skills as possible, we will have them achieve laboratory certifications, such as IACUC and CITI training, and offer unique diagnostic laboratory experience that will prepare students for their post-college career.

This proposal will utilize lab capabilities, equipment, and staff already present on SHSU campus but will allow for significant growth and opportunity that can provide sustainability for SHSU and its research laboratories moving forward. It will also provide crucial assistance to students by keeping STI and other important tests a “no cost” or “low cost” commodity.

The following team members will be participating in this proposal:

Dr. Tami Cook (PI): Tenure Professor in the biological sciences department, Ph.D. in Entomology, experienced parasitologist and will aid/ consult in the identification of parasites found after fecal tests are complete.

Kylee Kleiner (CO-PI): TRIES Research Scientist with a M.S. in Biology and Entomologist and over 8 years of field and laboratory experience. Will oversee in the training and management of the graduate student, volunteers, and running the laboratory.

Kelbi Delaune-Trotter: Coordinator of student engagement and team leader of EURECA. Will assist in reaching out to students and spreading the word about volunteer opportunities.

Ashley Morgan-Olvera: Director of Research & Education/Outreach

*We also plan to reach out to Dr. Williams at the Student Health Center.
**Tentative Budget**

<table>
<thead>
<tr>
<th>Item</th>
<th>BRIDGE Funds</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PERSONNEL:</strong></td>
<td>$60,000</td>
</tr>
<tr>
<td>Early professional, molecular testing as 75% effort x 24 months x annual salary of $40000</td>
<td>$60,000</td>
</tr>
<tr>
<td>CO-PI, as 12% effort x 24 months x annual salary of $42000</td>
<td>$10,080</td>
</tr>
<tr>
<td>Salary for one graduate lab assistant for sample processing and general project assistance for $2800/month for 9 months @ 50%</td>
<td>$12,600</td>
</tr>
<tr>
<td>Salary for one graduate lab assistant for sample processing and general project assistance for $2800/month for 9 months @ 50%</td>
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<td><strong>FRINGE BENEFITS:</strong></td>
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<td>Staff @32.4%</td>
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<td>Graduate lab assistant @7.65%</td>
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<td>Graduate lab assistant @7.65%</td>
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Dear Sir/ Madam

I am writing this letter to express my interest in pursuing a research project under your guidance as part of my academic journey. My intention is to submit a research proposal that will contribute to the existing knowledge in the field of Binder Jetting Additive Manufacturing process applied for biomedical implants using Aluminum Oxide Ceramics Powder. Having worked on additive manufacturing for ceramics particles using binder jetting 3D printing and 316L stainless steel in different projects with good research record and having acquired a Ph.D. in Industrial Engineering, MS, and BS degrees in Mechanical Engineering in addition to academic experience in different schools such as Texas A&M University and Sam Houston State University, I am confident that I possess the necessary skills to carry out the proposed research project. My motivation for pursuing this research stems from my desire to address the properties of the ceramics parts used in hip implants. The low impact toughness, low strength and low density of these implants are the main concerns. The parts made using 3D printing have low density due to different factors such as the layer thickness, powder size, powder morphology, printing speed, etc. To overcome some of these problems, a Vacuum-Assisted Powder Transfer System (VAPTS) will be designed to improve the packing of the powder in BJAM and to improve the toughness of the printed parts. A commercial ComeTrue® M10 CERAMIC & Binder Jetting 3D Printer will be used to print the parts. I believe that this research project will provide valuable insights into the field and contribute to its growth. If funded, I am planning to collaborate with my colleagues with research expertise in biomedical engineering, automation, curriculum development for sustainable resources, and AR/VR simulation environment. With this pilot data and test results, I will be able to explore some federal grant opportunities like Engineering Research Initiation (ERI) to which I submitted a proposal last year and which is limited to investigators that are not affiliated with “very high research activity” R1 institutions. A very recent NSF funding of similar interest is issued to a collaboration team of Penn State and University of Texas - Austin researchers (https://www.psu.edu/news/engineering/story/3d-printing-medical-devices-focus-2-million-nsf-grant/)

The aim of the proposed research project is to improve the density and the toughness of Binder Jetting Additive Manufacturing (BJAM) 3D printed parts. This will be accomplished by using aluminum oxide (Al₂O₃) powder and powder size range of 20 – 100 µm and nano powder. The nano powders will be used to close the gaps between the micro powders during the feeding and building process. The research questions that I intend to address include: A. Do the VAPTS that we propose improve the density and the toughness of the green part and/ or the sintered part of the implant? B. If there is an improvement, how much that improvement would be in terms of the relative density? C. When we add nano particles to micro particles, what percentage of each do we need to obtain the highest relative density and impact toughness using VAPTS? D. What is the optimum vacuum pressure needed to obtain the optimum toughness and relative density? E. What are the optimum printing parameters needed in case this technique is applied? I plan to employ the following techniques: i. Utilizing a ComeTrue® M10 CERAMIC & Binder Jetting 3D Printer (housed in my research lab), hip implants will be printed. I will start with building them with the normal method where the powder is poured in the feeding region and tapped with a plastic scraper then the powder is spread using a roller to the building bed. The parts then cleaned of powder and dried using a de-powdering station which is housed in my research lab. Next, the density using Archimedes method and toughness of the green parts using impact toughness tests will be measured. The green parts are then de-bound and sintered in the oven to improve their density and strength. Micro powders of Alumina of the 20 – 100 µm will be used for the printing process. The sintering process will be performed using the Across International CF1700 1700C Max using a. 12x8x8" Muffle Furnace and CF1200.12.8.8 CF1200 1200C Max (housed in my research lab). The impact toughness will be measured. The sintered parts density using Archimedes method will be measured in my research lab using a Torbal AGCN220 Internal Calibration Analytical Balance, 220 g x 0.0001 g balance in addition to Torbal Density Kit for AGCN Scales. The dry mass of the part will be measured first. Then the part is dipped slowly in a beaker of water to measure the wet mass using density measurement kit. Apparent density is calculated using the equation below:
\[ \rho_a = \rho_{wt} \frac{m_d}{m_d - m_w} \]

\[ \rho_a: \text{ Apparent density of the part.} \]
\[ \rho_{wt}: \text{ Water density at the measurement temperature} \]
\[ m_d: \text{ dry mass of the part} \]
\[ m_w: \text{ wet mass of the part} \]

**ii.** We will use the same printer and printing method as above, but VAPTS will be used to improve the density of the powder in the feeding bed. We will try to use VAPTS in two ways. First, we will connect the vacuum pump with vacuum sealer bags. Initially, we will use the micro powder only to study the effect of the vacuum system on the parts density and toughness. After this stage, the micro and nano powder will be mixed with different percentages using a lab powder mixer blender to distribute the powder uniformly. Next, the powder will be moved to the vacuum sealer bag to apply the vacuum pressure on the powder using the vacuum pump. The same parts printed without VAPTS, will be printed here, and the impact toughness and density of the green parts and sintered parts will be measured too. Second, VAPTS will be connected to the feeding bed directly to reduce the number of voids between the powder to the minimum. We will start with micro powder to study the effectiveness of this system on the green and the sintered parts density. Then we will use the lab powder mixer blender to mix the nano particles with the micro particles in different percentages. The same parts will be printed as before but with VAPTS connected directly to the feeding bed. Alumina powder, 20 – 100 µm will be used in addition to nano particles of different sizes. Different percentages of the micro and nano particles will be tested to reach to the maximum value of the sintered part density.

**iii.** The impact of the vacuum pressure on impact toughness and the density of the green and sintered parts will be investigated, too. Different values of the vacuum pressure will be tested to obtain the maximum toughness and relative density of the sintered parts. To answer the research questions, I will analyze the data using different statistical tools such as Analysis of Variance (ANOVA) to compare the results of this work with other researchers work in terms of the impact toughness and relative density of the printed parts using BJAM.

I am aware that pursuing a research project requires a significant commitment of time and effort, and I am willing to devote myself to this project wholeheartedly. I understand that this research project will be challenging, but I am eager to learn and grow through this experience.

I would be honored if you could guide me through this research journey and provide me with your valuable insights and feedback. I believe that your guidance and mentorship will be invaluable to me, and I am excited about the prospect of working under your supervision.

Thank you for considering my application. I look forward to hearing from you.

Sincerely,

Suleiman Obeidat
Title:
A data science perspective of the water quality and impacts of various hydrological processes on dissolved oxygen

Team members:
Dr. Di Gao, Assistant Professor of Statistics, main research area in Bayesian modeling, Machine learning, and Biostatistics.

Dr. Renjie Zhou, Assistant Professor of Geology, main research area in Hydrogeology, Geochemistry, and Computational Geology.

Dr. Dooyoung Kim, Assistant Professor of Statistics, main research area in Machine learning, Statistical learning, time series, and Deep learning.

Research Plan:
The team currently started the literature review process for this project. Also, Dr. Zhou and Dr. Gao applied for the Summer 2023 COSET undergraduate research grant as part of the preliminary study. The BRIDGE program can further support this project in relative research within the state of Texas. The team will later seek external research funds like NSF-career to support the extension of this project to a national geo circle.

Project narrative:
Big Data, Machine Learning, and Bayesian Statistics have all been internet “hot searches” in recent years, and these three areas are all integral to Data Science. Motivated by the need to include data analysis and computing as formal academic endeavors, Data Science has been a solid part of academia since the 1960s (Naur, 1996). Data science can play an important role in environmental science and health science. This project is from a data science perspective to help solve specific water quality (Karst) research problems, including quantification and prediction.

The karst environment contains numerous natural resources and plays an important role on ecosystems. Karst aquifers provide drinking water for approximately a quarter of the world's population and serve as crucial groundwater sources for many regions. For example, they are the primary freshwater resource for Vienna in Austria, Rome in Italy and San Antonio in the U.S. (Hartmann et al., 2014; Kaçaroglu, 1999). Also, karst aquifers, caves and landscapes host various unique ecological niches and provide habitats to endemic species such as the genus Heteroplexis (Asteraceae) and some salamanders (Bonacci et al., 2009).

The concentration of dissolved oxygen (DO) is a critical parameter for assessing water quality and crucial for the survival of aquatic organisms: insufficient DO levels will harm the growth and development of aquatic life, resulting in increased mortality rates, while excessive DO levels can also have adverse effects on the health of aquatic ecosystems (Post et al., 2018). For instance, in our studied area, Barton Springs (Austin, Texas) is the unique habitat for the Barton Springs salamander and the Austin Blind salamander. Salamanders are very sensitive to contaminants and DO and can serve as an important indicator of water quality. Adequate DO is vital for all life stages of salamanders: DO of 3.4 mg/L can result in a significant increase of their mortality rate and DO of 4.4 mg/L is considered as the No Observable Adverse Effect Level (NOAEL) (Woods et al., 2010). Both Barton Springs salamander and Austin Blind salamander are endangered species under the U.S. Endangered Species Act. The decrease in salamander populations may be caused by the decline in DO concentrations in the Barton Springs discharge (Mahler & Bourgeois, 2013). Therefore, it is important to investigate DO fluctuations and their influencing factors for the conservation and management of local ecosystems in the karst environment.
The concentration of oxygen dissolved in water is determined by the equilibrium between processes of the oxygen production and consumption and can be impacted by natural factors, such as discharge, pH, water specific conductance, atmospheric pressure, water temperature, dissolved solids concentration and others. The main sources of the oxygen gas incorporated in water consist of the re-aeration from atmosphere, the photosynthetic oxygen production of plants in the water and DO loading. It is consumed by the oxidation of carbonaceous and nitrogenous materials, sediment oxygen demand (SOD), and the respiration of aquatic livings (Csábrági et al., 2017). The relationship between DO and other hydrological processes in the karst environment may differ from that in surface water and groundwater due to differences in physical and chemical conditions. In the karst system, due to the rapid flow in the well-developed fractures and conduits, the karst water is closely connected to the surface water and has quick response to storm events. As a result, physical and chemical properties in karst groundwater systems, such as DO, pH, water specific conductance, turbidity, and water temperature, may show different characteristics and oscillate greatly over a time scale of hours to months.

The Barton Springs segment of the Edwards aquifer is composed of karstified Cretaceous limestone and dolomite. The Barton springs is the fourth largest spring in Texas and provides water recharge to Town Lake and Barton Creek. It is the primary discharge port for the Barton Springs segment of the Edwards aquifer in Central Texas and serves as an important source of local municipal, industrial, commercial, recreational, agricultural and recreational water demands. The metrological and hydrological data in Barton Springs, including precipitation, spring discharge, temperature, pH and other, are measured and collected by monitoring sites managed by U.S. Geological Survey (USGS) and National Oceanic and Atmospheric Administration (NOAA). Because of karstification, several types of porous spaces are observed in such a karst system: micropores that developed during the formation of the carbonate bedrock, small fractures and fissures because of tectonic activities, and large fractures and conduits (see Figure 1). Consequently, karst systems are characterized by tremendous heterogeneities in hydraulic properties and complex hydrological behavior. This makes it challenging to obtain detailed characterization of the karst internal structure and hydrological properties using physics-based approaches. However, multiple statistical methods could shed light on the interrelationship between DO concentrations and other hydrological processes. Descriptive statistics will first be observed. Based on the nature of the correlation, a generalized linear model can be proposed as the preliminary model. This generalized linear model can later be extended to Bayesian machine learning approach. Also, an updated prior information structure can be developed later to involved repeated updated data.

Figure 1. The structure of a karst aquifer (source: Austintexas.gov)
Dear BRIDGE program,

I am Yixin “Cindy” Chen, an Associate Professor in the Department of Communication Studies, and my research focuses on health communication and health/risk behaviors. I am writing to express my interest in applying for a BRIDGE grant to conduct research on the effects of health literacy/numeracy and risk perception on salt/sugar/fat consumption and the incidence of heart disease/obesity among people living in Texas.

Heart disease and obesity are significant public health concerns in the U.S., especially in Texas. According to data from the CDC, heart disease is the leading cause of death in Texas, with a death rate of 223.2 per 100,000 people in 2018-2020 (CDC, 2023a). The obesity rate in Texas has also steadily increased in recent years, with 36.1% of adults in the state classified as obese in 2021 (CDC, 2023b).

Existing research has shed light on the relationships among health literacy/numeracy, risk perception, salt/sugar/fat consumption, and heart disease/obesity in diverse populations. Consuming too much salt is associated with high blood pressure and heart disease, while excessive sugar and fat consumption is linked to obesity, according to the Harvard School of Public Health (2023). Evidence suggests that adult primary care patients with low numeracy skills are more likely to have a higher BMI (Huizinga et al., 2008), and that perceived risk of consuming too much salt/sugar/fat may significantly influence people’s food choices (Rojas-Rivas et al., 2020; van der Vossen-Wijmenga, 2022). Previous findings have also indicated that lower adherence to a healthy diet (e.g., with lower salt/sugar/fat intake) is associated with obesity (Guo et al., 2004), and higher adherence to a healthy diet is associated with a lower risk of cardiovascular disease (Mertens et al., 2018). The American Heart Association emphasized, in a scientific statement, that inadequate health literacy and numeracy are associated with adverse cardiovascular effects, and that it is critical to address barriers imposed by limited health literacy/numeracy (Magnani et al., 2018).

At present, no research specifically addresses the relationships among health literacy/numeracy, risk perception, salt/sugar/fat consumption, and the incidence of heart disease/obesity in the Texas population. The research I propose here could inform the development of health communication interventions to improve health behaviors and reduce the incidence of heart disease/obesity in the state's population. Specifically, this research aims to:

1. Assess the effects of literacy/numeracy skills and risk perception on salt/sugar/fat consumption;
2. Investigate the effects of literacy/numeracy skills and risk perception on the incidence of heart disease and obesity;
3. Examine whether risk perception serves as a theoretical pathway in the relationship between literacy/numeracy skills and salt/sugar/fat consumption and in the relationship between literacy/numeracy skills and the incidence of heart disease/obesity;
4. Explore whether literacy/numeracy moderates the influence of risk perception on salt/sugar/fat consumption and on the incidence of heart disease/obesity.

Yours sincerely,

[Name]
Associate Professor
Department of Communication Studies
Sam Houston State University
April 2, 2023
To achieve these goals, I propose to conduct a cross-sectional survey of adults residing in Houston, utilizing validated measures to evaluate health literacy/numeracy, risk perception, salt/sugar/fat consumption, and the incidences of heart disease/obesity. I am seeking $10,000 in funding, with $5,000 allocated for participant recruitment in Houston and $5,000 earmarked for the salary of a graduate research assistant. This grant will allow me to generate preliminary data that could serve as a valuable foundation for future grant applications aimed at agencies such as the Texas Heart Institute, NIH, and the Robert Wood Johnson Foundation.

As a health communication researcher, I have conducted extensive research on health literacy/numeracy, risk perception, and health behaviors. In my previous work, I have investigated the impact of numeracy on health information seeking (Chen & Feeley, 2014) and binge-drinking intention (Chen & Yang, 2015). Additionally, I have studied the relationship between risk perception and a range of health/risk behaviors, including smoking cessation (Chen & Yang, 2017), binge drinking (Chen, 2018), protective behaviors against smog (Chen & Liu, 2023), and COVID-19 vaccination behavior (Chen, 2023). Given my experience in these areas, I am confident that I can successfully expand my research program to include salt/sugar/fat consumption and heart disease and obesity.

It is crucial to understand the factors contributing to heart disease and obesity, given the prevalence of these health issues in Texas (CDC, 2023a, 2023b). This project aligns closely with the objectives of the BRIDGE grant, as it aims to improve health outcomes and life expectancies of the population in Texas. By investigating the effects of health literacy/numeracy and risk perception on salt/sugar/fat consumption and the incidence of heart disease/obesity, this project has the potential to make a significant contribution to understanding the factors that influence heart disease and obesity among Texans. Additionally, it could inform the development of effective health communication interventions to improve health outcomes in Texas and provide guidance for developing health policies related to food labels and food safety.

I am excited about the opportunity to conduct this important research, and I look forward to hearing about the next steps for my grant application. Thank you for your consideration.

Sincerely,

Yixin “Cindy” Chen, Ph.D., Associate Professor
Department of Communication Studies
Sam Houston State University
Huntsville, Texas 77341-2299
Phone: (936) 294-3164; Email: cindychen@shsu.edu
References


April 3, 2023

Dear BRIDGE Committee,

A strong synergy exists between the quality and quantity of research produced at an institution; and the institution’s commitment to effectively mentoring students in undergraduate research, and helping faculty develop the leadership skills need to effectively lead research teams.

The Ramps into Research is a pilot program of the STEM Center at SHSU. It is based on the idea that mindfully designed research onboarding experiences can make a transformative contribution to the learning, retention, and success of undergraduate researchers, and to the success of faculty research programs. Collectively, we aim to build a rigorous, student-friendly interactive modules for training students in the methodologies most relevant to their research; in a manner that supports wise and efficient use of both the faculty mentor’s and the student researcher’s time.

Funding is currently expiring for the STEM Center, and consequently for the STEM Center’s Ramps into Research pilot program. Funding consists of $1000 stipends to faculty who complete a research learning module for the collaboration. Student co-authors and evaluators are paid hourly wages up to, respectively, $500 and $200. Student module co-authors are drawn wherever possible from current undergraduate research students who are learning the methodology in question or recruited from promising students not yet engaged in research activities. Co-authors are supported by an hourly wage and will be learning (or have recently learned) the methodology that the module is being written for. Similarly, student evaluators are recruited to work through a module; master the method; obtain certification and provide constructive feedback on where the module might be improved. We expect many student evaluators will transition from this experience into a longer-term research project with the selected faculty mentor.
We also support faculty collaborators through a faculty learning community that meets monthly to discuss important topics related to the design and implementation of research projects; and more generally mentoring that facilitates long-term success for the student and the research.

We believe that this program meets emerging industry and societal needs of the region and Texas as identified by individual primary investigators. To date it has funded mentoring modules related to energy, health, and biomedical sciences. We believe that it has the potential to strengthen grant applications as well, by strengthening the training of undergraduate researchers, and the quality of the preliminary data that they gather in support of external grant applications.

Currently, the program is limited to the STEM disciplines. We would like to extend the program to faculty mentors across the university working in fields encompassed by the BRIDGE program. Currently, funding for this program is expiring. We have applied for external funding to continue its development within the STEM disciplines. We believe that if it continues to develop along the current trajectory, that its long-term value to the overall research enterprise will be worthy of institutionalization. Here we request intermediate funding to be able to continue to sustain and develop the program; to extend it beyond the College of Science and Engineering Technology to all fields encompassed by the BRIDGE program; and to continue facilitating a community of faculty mentors committed to developing strong and effective training within our research programs.

Sincerely,

The faculty leadership team of the STEM Center’s Ramps into Research Program
David E. Thompson, PhD, Professor, Department of Chemistry
Faruk Yildiz, PhD, Professor and Chair, Department of Engineering Technology
Tarek Trad, PhD, Professor, Department of Chemistry
Taylor Martin, PhD, STEM Center PI and Associate Professor, Department of Math
Screening and Characterization of Potential SARS-CoV-2 Antiviral Small Molecules

**Background and Specific Aims:** Coronaviruses (CoVs) are a group of positive single-stranded RNA viruses with first human CoVs (HCoVs) discovered in the 1960s. Over the years, they have been known to cause respiratory illnesses ranging from sporadic mild common colds to outbreaks of severe respiratory diseases with viral pneumonia. The most notable of these outbreaks include the epidemic of Severe Acute Respiratory Syndrome (SARS) in the early 2000s, caused by SARS-CoV, and the ongoing COVID-19 pandemic caused by the highly transmissible SARS-CoV-2. These outbreaks resulted in significant fatalities and highlighted the need for effective antiviral therapies. Currently, the mainstay of treatment for these viral illnesses is supportive care. Although antiviral drugs such as remdesivir has been authorized for emergency use to treat COVID-19, but at this time, safety and efficacy data remain limited. Additionally, the use of the combination drug nirmatrelvir/ritonavir has been limited to mild or moderate COVID-19 cases. Therefore, there is a pressing need for effective and safe antiviral therapies to reduce the morbidity and mortality associated with COVID-19.

Cathepsins are a group of lysosomal proteases, involved in protein degradation, antigen presentation, and tissue remodeling. Specifically, cathepsin L (CatL) has been implicated in the cellular entry of SARS-CoV and SARS-CoV-2. Blocking cathepsin L activity may therefore be a promising therapeutic target to mitigate these illnesses.

In this study, we will use our previously developed high throughput screening assay (HTSA) to screen for CatL inhibitors, that could be effective in blocking SARS-CoV-2 viral entry. Furthermore, we will use an already developed vesicular stomatitis virus (VSV)-based pseudovirus system to screen for other SARS-CoV-2 entry inhibitors using a cell-based assay.

This study will accomplish the following specific aims:

**Aim #1:** Screen for inhibitors of CatL-mediated cleavage of SARS-CoV-2 spike (S) protein using our previously optimized high throughput screening assay (HTSA).

In this aim, we will synthesize peptides derived from SARS-CoV-2 and SARS-CoV S proteins which contain the CatL cleavage sites. We will also synthesize peptides derived from host cell proteins, such as human pro-neuropeptide Y (pro-NPY) and peptide F, that contain CatL cleavage sites. The peptides will then be used in a high throughput screening assay (HTSA) to screen for small molecules that inhibit the cathepsin L mediated cleavage of SARS-CoV-2 and SARS-CoV S protein-derived peptide but not of the host cell derived peptides. This will allow us to discover small molecules that are antivirals without disrupting the physiological function of CatL in cleavage of host cell proteins.

Hits identified from the HTSA will be verified in a cell-based entry inhibition assay. The assay will utilize a pseudovirus system consisting of vesicular stomatitis virus (VSV) that expresses SARS-CoV-2 S protein on its surface and enhanced green fluorescent protein (eGFP) as a marker of infection. The pseudovirus system will be obtained from Dr. Sean Whelan at Washington University School of Medicine at Saint Louis, MO.
Aim #2: Screen for entry inhibitors of SARS-CoV-2 using VSV-SARS-CoV-2 S pseudovirus in a cell-based entry inhibition assay.

To achieve this aim, we will utilize the infectious molecular clone of VSV that expresses eGFP as a marker of infection. We will screen for entry inhibitors using the same library in aim 1.

Research Significance

The Severe Acute Respiratory Syndrome (SARS) epidemic in the early 2000s and the ongoing COVID-19 pandemic have had devastating impacts on global health, resulting in significant morbidity and mortality. The development of effective antiviral therapies to reduce the severity of these viral diseases is critical in mitigating their impact on public health. This study aims to identify small molecules that can inhibit the activity of cathepsin L, a key player in the cellular entry of SARS-CoV and SARS-CoV-2. The successful identification of such molecules has the potential to save countless lives and improve the quality of life for individuals around the globe.

Collaboration and Unique Expertise

The project will be carried out in SHSU-COM and involves collaboration with experts from Sam Houston State University, Washington University (Saint Louis, MO), and California Northstate University (Elk Grove, CA). Our interdisciplinary team of researchers will bring diverse skill sets that will enable us to approach the project from multiple angles, combining virology, microbiology, pharmacology, cell biology, molecular modeling, and computational chemistry.

From Sam Houston State University, our team includes:

Hatim Elshabrawy, Assistant Professor of Microbiology, Immunology, and Pathology. As a microbiology/immunology expert, Dr. Elshabrawy offers a strong background in infectious diseases, with specific expertise in the pathogenesis of SARS-CoV-2 and antiviral drug development.

Sahar Soliman, Assistant Professor of Pharmacology. As a licensed pharmacist and a pharmacology expert, Dr. Soliman brings extensive knowledge of the pharmacokinetics and pharmacodynamics of drugs.