

CBRE

Newsletter

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The Center for Biomedical Rehabilitation & Engineering (CBRE) investigates human mobility, including balance, posture and gait, for unimpaired as well as impaired populations.



The mission of the CBRE is to seek new knowledge tied to human balance and mobility for a wide array of populations and to provide meaningful experiential learning and hands-on research training to equip and prepare a diverse demographic of students for the biomedical engineering workforce.

The CBRE was conceived and created by Dr. Lara Thompson who joined UDC as a faculty in Fall 2013. As a new faculty and new Ph.D. graduate, she was tasked with and given the opportunity to start a brand-new biomedical engineering research laboratory and program, each completely from scratch.

With equipment procured predominantly from National Science Foundation (NSF) awarded grants, the CBRE was opened in Summer of 2015. Since then, the laboratory has attracted multiple sponsored projects from NSF, National Institutes of Health (NIH), Department of Aging and Community Living (DACL), National Aeronautics and Space Administration (NASA), and others and trained a diverse body of student researchers with various backgrounds tied to biomedical engineering, biology, mechanical engineering, civil engineering, electrical & computer engineering, and computer science.



Fall 2023 VR Aging Balance Study led by Dr. Thompson and her student researchers.

Fall 2023

CBRE Researchers Past and Present

UDC CBRE Research Associate, Frank Borris III receives competitive NIH NIBIB Post-Baccalaureate opportunity

Frank Borris, III recently was chosen for a highly selective post-baccalaureate opportunity at the National Institutes of Health (NIH). Frank will be working under Dr. Parinaz Fathi who leads the National Institute of Biomedical Imaging and Bioengineering (NIBIB) unit for Nanoengineering and Microphysiological systems, under the branch section of Immunoengineering. This particular post-baccalaureate opportunity is for recent college graduates to pursue full-time research (for 1-2 years) in the NIH Intramural Research Program. It is specifically catered for graduates who are interested in graduate or professional school, and it also comes with professional programs, educational and career advising, and access to trainings, workshops and classes.



Frank Borris III B.S. in Bioengineering North Carolina A&T State University

Dr. Thompson first met Frank several years ago as a high school student when he visited the CBRE, and then again in the fall of 2022. Frank is a recent North Carolina A&T graduate of their Bioengineering program. Since Fall 2023, Frank has been working with the CBRE and has been doing a wonderful job. We wish him well in his position that will be starting in January 2024.

UDC CBRE Research Associate Bridget Thorpe receives exclusive Science & Technology Internship at the White House

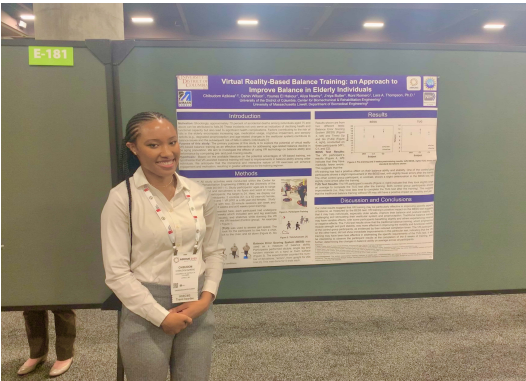


Bridget Thorpe Ph.D. Candidate, M.S. in Biomedical Engineering George Washington University

Congratulations to **Bridget Thorpe** on obtaining a competitive internship at the White House. Since Spring 2022, Bridget has been working in the CBRE as an invaluable contributor to our human subject research studies. Bridget holds a M.S. in Biomedical Engineering from George Washington University and is currently a Ph.D. candidate. We are thrilled that Bridget was offered such a prestigious internship in the White House Office of Science and Technology Policy (OSTP). The mission of the OSTP is to maximize the benefits of science and technology to advance health, prosperity, security, environmental quality, and justice for all Americans. Serving as an OSTP Intern will provide her with a unique opportunity to work closely with senior White House officials and science and technology policy analysts. This White House Internship Program is aimed at developing public service to emerging leaders, with an emphasis on nurturing valuable skills while supporting the work of the White House and furthering the priorities of the Biden-Harris Administration. Each year, leaders from around the country participate in the White House Internship Program to dedicate their time, energy, and experience to serve the country through public service. Bridget will begin her internship in January 2024.

ABRCMS 2023 Award: Chibudom Azikiwe

Recently, **Chibudom Azikiwe** received a presentation award for her poster entitled *"Virtual Reality-Based Balance Training: an Approach to Improve Balance in Elderly Individuals"* at the ABRCMS in Phoenix, AZ. Co-authors on the poster were Oshin Wilson, Younes El Hakour, Aliya Newby, J'niya Butler, Roni Romero, Lara A. Thompson with special acknowledgements to Frank Borris, III and Bridget Thorpe. The Annual Biomedical Research Conference for Minoritized Scientists (ABRCMS) has been described as the "go-to conference for historically excluded community college, undergraduate and postbaccalaureate students in science, technology, engineering and mathematics." In 2022, the ABCRMS hosted over 5,550 individuals which included, 2,899 undergraduate, community college, and post-baccalaureate students.



Chibudom Azikiwe presenting her research at the ABRCMS Conference.

Chibudom first approached Dr. Thompson at the start of Summer 2023, seeking to have a hands-on research experience in biomedical engineering. Chibudom is a student in the Biomedical Engineering Department at UMass Lowell, however, she is a native to Washington, DC. Like so many DC natives, she did not know UDC had a Biomedical Engineering program, nor

facilities, like the CBRE. And like so many DC high school students, she was encouraged to go out of state for college. Dr. Thompson was glad to make an impact in terms of Chibudom's research exposure and professional development, and in terms of broader impact, also enlightening the public about what we do at UDC, even if one person, one student at a time.

Staying Connected

A note from one of our first CBRE Research Assistants, Beachrhell Jacques (B.S. in Mechanical Engineering, Class of 2016) One of our first CBRE Research Assistants, Beachrhell, reached out recently. She worked with Dr. Thompson from Fall 2013 (prior to the CBRE lab's opening) through Fall 2015 and graduated in the Spring of 2016. After several years working for the Aero industry in Haiti, she is currently pursuing her MBA this fall in England and Dr. Thompson helped to provide one of her recommendations. During her time as a UDC student, Biomedical Engineering was not yet offered as an official degree program; however, she took the related courses and was one of the first students in the CBRE lab (opened Summer 2015). Beachrhell was one of our top students in SEAS and it is always great to hear from her, each year, about her accomplishments and future endeavors.



Beachrhell and Dr. Thompson at White House Initiative

Congratulations!

Two UDC CBRE Researchers and BME (B.S.) alumni receive their M.S. in Mechanical Engineering with a focus placed in Biomedical Engineering

Roni Romero (UDC Bachelor of Science (B.S.) in Biomedical Engineering graduate Fall 2020) received his Master of Science (M.S.) in Mechanical Engineering, Biomedical Engineering focus. His thesis project was entitled *"Probing the Effects of a Simulated Exploration Extravehicular Mobility Unit (xEMU) Spacesuit on Balance and Gait"* which involved a collaboration between the UDC CBRE and the NASA Johnson Spaceflight Center's (JSC's) Anthropometry and Biomechanics Facility (ABF). Being the first in his family to hold a B.S. degree, Roni is currently pursuing his Ph.D. in Engineering and Computer Science at UDC.

Mulatu Bachoro (UDC B.S. in Biomedical Engineering graduate Spring 2021) received his Master of Science (M.S.) in Mechanical Engineering, Biomedical Engineering focus. His research project was entitled *"A comparison of post-training balance performance metrics of older healthy adults and survivors of stroke to younger individuals"*. Mulatu Bachoro holds a position at the United States Patent Office.



Roni Romero at NASA JSC

CBRE Exposure and Outreach

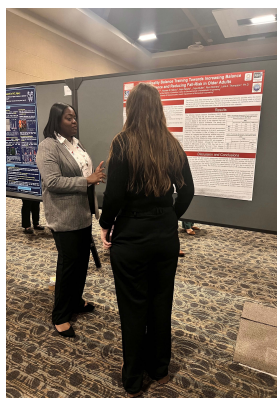
Annual Biomedical Research Conference for Minoritized Scientists (ABRCMS): Phoenix, AZ



(From Left to Right) Roni Romero, Chibudom Azikiwe, Oshin Wilson and Younes ElHakour

Four CBRE research assistants, Chibudom Azikiwe, Oshin Wilson, Younes ElHakour, and Roni Romero (pictured above) attended the Annual Biomedical Research Conference for Minoritized Scientists (ABRCMS) in Phoenix, Arizona the week of November 14, 2023, giving three research presentations. Chibudom received an award for her presentation (pg. 3).

The research presented involved the virtual reality balance training study the CBRE Lab is currently conducting in the aging population, as well as the previous research work conducted between the NASA JSC Anthropometry and Biomechanics Facility (ABF) and the UDC CBRE. After a couple of years of very limited travel due to the pandemic, it was just great to see the students finally be able to have a meaningful in-person professional experience at the conference.



Left: Oshin Wilson presenting her research tied to the CBRE's aging balance study.



Right: Roni Romero presenting on his research tied to NASA JSC/UDC CBRE and the EVA suit.

For over 20 years, the **Annual Biomedical Research Conference for Minoritized Scientists (ABRCMS)** – recipient of the 2019 AIMBE Excellence in STEM Education Award – has been the go-to conference for historically excluded community college, undergraduate and postbaccalaureate students in science, technology, engineering and mathematics. As ABRCMS has continued to grow and evolve, it has also become a space for graduate students, postdocs, faculty, program administrators and more.



CBRE Research Students at 2023 ABRCMS Conference (Left to Right) Chibudom Azikiwe, Oshin Wilson, Younes ElHakour, and Roni Romero.

Perry Initiative Program

The Perry Initiative Outreach, held Saturday, November 18th at UDC, was a day-long workshop focused on providing hands-on activities, speakers and modules, ultimately aimed to inspire young women in high school to pursue career paths in medicine, orthopedics, biomedical engineering and other medical, STEM-related fields. Forty female high school students were selected to participate. Though this activity is hosted at select locations nationwide, this is the first time it has ever been hosted at UDC and was sponsored by the UDC CBRE.



Students learning to suture, drill bones using power tools and make forearm casts with orthopedic surgeons and Perry staff.



Dr. Thompson (center) with research students after her presentation on the BME program. (Left to Right: Michael Bennett, Frank Borris III, Younes ElHakour, Brian Douglas, Jr., Bridget Thorpe, Oshin Wilson and J'niya Butler)

Speakers Series

Fall 2022 & Fall 2023

Dr. Murray Loew: November 7, 2023
George Washington University
Medical Imaging Meets AI: Prospects and Perils

Dr. Robert Morhard: October 26, 2023
National Institutes of Health (NIH)
Development of Low-Cost Injectable Tumor Therapy Suitable for Use in Resource-Limited Settings

Dr. Kyle Ott & Dr. Nadeau: October 12, 2023
Johns Hopkins University
Opportunities for Human Performance and Biomechanics Research

Dr. Kimberly Kontson: September 26, 2023
US FDA Center for Devices and Radiological Health, Office of Science and Engineering Laboratories
Human Device Interaction Research Program

Dr. Erika Moore: September 12, 2023
Assistant Professor of Bioengineering
University of Maryland, College Park
Leveraging biomaterials to direct the immune response during wound healing

Dr. Jay Barton: September 7, 2023
Research Mechanical Engineer
Baltimore Veterans Administration Hospital Balance and Balance Disorders: An Engineering Perspective

Dr. Xin Liu: November 17, 2022
Professor of Computer Science
University of California, Davis
AI-based Sensing for Gait Analysis in Healthcare Applications

Dr. Joo H. Kim: November 15, 2022
Associate Professor of Mechanical Aerospace Engineering
New York University (NYU)
Stability, Efficiency, and Their Trade-Off in Bipedal Walking of Robots and Humans

Dr. Jeffery Hooper: November 8, 2022
Director, Department of Biomedical Engineering Children's National Hospital (CNH)
Introduction & Opportunities Tied to Clinical Engineering

Dr. Jamel Ali: November 1, 2022
Assistant Professor of Chemical and Biomedical Engineering
Florida A&M University-Florida State University (FAMU-FSU)
Low-Reynolds Number Locomotion for Nanoscale Biomedical Robotics

Dr. Jeremy D. Brown: October 18, 2022
Assistant Professor in the Department of Mechanical Engineering
Johns Hopkins University
Understanding the Utility of Haptic Feedback in Telerobotic Devices

Dr. Doug Brungart: October 13, 2022
Chief Scientist Audiology and Speech Center
Walter Reed
Vestibular Research Presentation

Dr. Quentin Sanders: October 4, 2022
George Washington University
Incorporating patient-focused design to engineer the next generation of rehabilitation robotics for upper extremity rehabilitation post stroke



Top: Two orthopedic surgeons shared with students their experiences in the medical field. Bottom: power tools to drill through bones.



Students learning to make post-operation sutures using bananas.



Dr. Thompson presenting her background and journey into the Biomedical Engineering field.



Top: Dr. Thompson and Dr. Peebles with research students and attendees at DACL Fall Awareness Event 2023.
Bottom: Roni Romero (left) and Bridget Thorpe and Brian Douglas, Jr (right) administer fall-risk assessments to attendees.



The UDC Center for Biomechanical & Rehabilitation Engineering (CBRE) student researchers and associates led the stations tied to balance and fall-risk speaking with and assessing the participants. We administered balance assessments, via the timed up and go and the 30 second sit to stand assessment, and were able to provide quick feedback to the attendees on if they were at increased risk of falling. We also did a home checklist with the attendees in terms of environmental fall-risk assessment. Lastly, attendees were informed about the CBRE lab and the VR Aging study that is taking place for fall 2023 and beyond.

Last year, in September 2022, UDC biomedical engineering students also volunteered at a Falls Trivia event held by the DACL, however the events were held offsite - We hope this can be a yearly event hosted by UDC.

This activity was aligned with our NIH NIA MSTEM project (Co-PIs: Dr. Chen, Dr. Denis, Dr. Zhang, Dr. Peebles; PI: Dr. Thompson). Tori Goldhammer was the lead organizer for all the sites and Ms. Ajeenah at the UDC site.

DACL FALL Prevention Awareness Day Event September 21, 2023

September was Falls Awareness month and there is a strong need to enlighten and raise awareness of fall-risks for older individuals and the importance of maintaining balance as we age. On Saturday September 21st, the Department of Aging and Community Living (DACL) held falls awareness events at each of the 8 wards within Washington, DC. The UDC Ballroom was the host site for Ward 3, and across the 8 wards, there were roughly 240 attendees with UDC having between 35-40 of those attendees.



Research students administering balance and fall-risk assessments with attendees.





Dr. Bruce Tromberg, Director at NIH NIBIB presenting Dr. Thompson with a plaque for her lecture during their Advisory Council meeting on May 16, 2023.

Anatomy Connected Plenary Speaker for American Association for Anatomy (AAA) session:

At the Interface of Engineering & Medicine: Spearheading Engineering Research and Educational Initiative, on Sunday, March 26, 2023. Dr. Thompson discussed her research on human mobility to a ballroom full of conference attendees. Her talk focused on her overall research on improving balance and reducing fall-risk in the aging population. The American Association for Anatomy (AAA) is the professional home for more than 2,000 students, teachers, and practitioners of the anatomical sciences.

Next Issue

- Virtual Reality Aging Balance Research at the CBRE
- Upcoming NIH C06 Research Center
- Activities and researchers of the NIH NIA MSTEM project
- Student news
- And more!

Acknowledgments:

Activities are supported by NIH NIA R25AG067896 and NSF 2229575

UDC CBRE Director gives 3 high-impact seminars in 2023

Dr. Thompson was invited by the **National Institutes of Health, National Institute of Biomedical Imaging and Bioengineering (NIH NIBIB)** Director, Dr. Bruce Tromberg, to present a Lopez lecture at their Advisory Council meeting on Tuesday, May 16, 2023, their first in-person Lopez lecture since 2019. The National Advisory Council for Biomedical Imaging and Bioengineering (NACBIB) advises the Secretary, Department of Health and Human Services (DHHS), the Assistant Secretary for Health, DHHS; the Director, National Institutes of Health (NIH), and the Director, National Institute of Biomedical Imaging and Bioengineering (NIBIB) on matters relating to the conduct and support of research, training, health information dissemination and other programs that address biomedical imaging, biomedical engineering and associated technologies and modalities with biomedical applications. The NACBIB meets three times per year, typically in January, May, and September. Council members provide the second level review for all applications for funding of research and training grants or cooperative agreements by the NIBIB. The Council also advises on policy and program priorities.

The National Association of Academies of Science and American Junior Academy of Science (NAAS AJAS)

invited Dr. Thompson to give the Virtual Keynote Address for the 2023 Annual Conference on February 10, 2023. The National Association of Academies of Science (NAAS) is a not-for-profit organization whose mission is to promote the scientific and science education goals of its state, regional and municipal academies of science. The NAAS consists of 47 state, regional, and community academies of science, which are organized to encourage scientific inquiry and research experiences. One of the most important functions of the NAAS is sponsorship of the American Junior Academy of Science (AJAS). The AJAS is the only US honor society recognizing America's premier high school students for outstanding scientific research. Each state's Academy of Science nominates high school students as AJAS delegates. These delegates attend the AJAS annual conference.

More Information at UDC.EDU/SEAS/CBRE