BRAIN CENTER NEWSLETTER

OUR MISSION

The BRAIN Center will develop safe, effective, and affordable personalized neurotechnologies for diagnostics, restoration, enhancement, and rehabilitation of sensory, motor, affective, and cognitive functions. This mission will be pursued by supporting innovative interdisciplinary research across the multiple dimensions of brain function and behavior with the ultimate goal of improving quality of life.

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WORKFORCE DEVELOPMENT UPDATE

TOP STEM STUDENTS AND TEACHERS SELECTED FOR PRESTIGIOUS RESEARCH PROGRAMS AT BRAIN

We are thrilled to announce the completion of the selection process for both the NSAP, REM and REU programs at the University of Houston IUCRC BRAIN Center. Our team carefully reviewed and evaluated numerous applications from highly qualified candidates across the country. We are excited to welcome a diverse group of teachers, post-baccalaureate students, undergraduate students, and high school students with educational backgrounds in various STEM fields, including biomedical engineering, computer science, neuroscience, and chemistry, among others. The NSAP, REM and REU programs will provide these students with invaluable hands-on experience and training in highly specialized technical skills related to the study of the brain, complementing and enhancing their education. We look forward to the start of the programs and are eager to see the growth and success of our talented students.

In addition to the technical skills, the programs also offer students the opportunity to engage with leading experts in the field of neural engineering and neuroscience. The University of Houston IUCRC BRAIN Center is committed to providing a supportive and stimulating environment where students can explore their potential and develop their passion for STEM fields.

- NSAP program: The post-baccalaureates will participate in a 10-week summer program at the University of Houston IUCRC BRAIN Center, starting from May 30th and ending on August 4th, 2023.
- REM program: Four STEM teachers and nine high school students will attend a four-week summer program, starting from June 5th and ending on July 1st, 2023.
- REU program: The selected students will participate in a 10-week summer program at the NSF BRAIN Center, starting from May 30th and ending on August 4th, 2023.

REM TEACHERS 2023

WELCOME TO UNIVERSITY OF HOUSTON IUCRC BRAIN CENTER

We are proud to introduce the selected REM teacher who will be joining us at the University of Houston IUCRC BRAIN Center for the upcoming program.

Savannah Salazar
High School
Biology Teacher

John W. Hite
Clear Falls High School
Biotechnology Program
Director and Instructor
of Clear Creek ISD

Sydney Jeffcoat
High School
Science Teacher

Brandon Cooper
High School Computer
Science Teacher

REM STUDENTS 2023

WELCOME TO UNIVERSITY OF HOUSTON IUCRC BRAIN CENTER

The REM program at the University of Houston IUCRC BRAIN Center is proud to welcome a diverse and exceptional group of high school students who will contribute to the advancement of neurorehabilitation and neuro-engineering research.

Ryan Lorente
Clear Falls High School

Ryan Noorbakhsh
Clear Creek High School

Theodore Cowan
Energy Institute High school

Katherine Fernandez
Kerr High School

Surya Fincke
Clear Lake High School

Khue Phan
Kerr High School
NASA High School
Aerospace Scholars

Samaah Huda
Clear Lake High School

Adaeze Nnadi
Clear Lake High School

Patrick Hoang
Clear Lake High School

Tecnológico de Monterrey

STUDENT AWARDS

Maxine Annel Pacheco Ramírez

Annel, a student from the School of Engineering and Science at Tecnológico de Monterrey, has received the prestigious Outstanding Academic Score award for achieving the highest GPA among her peers. This award recognizes her exceptional academic performance, placing her in the top 1% of students in her program.

Congratulations to Maxine for her remarkable achievements and for being recognized for her outstanding academic performance!

Milton Osiel Candela Leal & Dacia Martínez Díaz

Milton and Dacia have received the distinguished Outstanding Career award for their exceptional professional accomplishments. Congratulations to both on this well-deserved recognition!

Fernanda Teresita Garibay Larralde

Fernanda has been awarded the Outstanding Career award in recognition of her exceptional professional achievements. Congratulations to Fernanda for receiving the Outstanding Career award, a well-deserved honor for her hard work and dedication to her career!

Tecnológico de Monterrey

FACULTY AWARDS

Dr. Manuel Cebral

Dr. Cebral, a distinguished faculty member of the BRAIN program, has been honored with the esteemed Ciencia de Frontera 2023 award by CONACYT (National Concil of Science and Technology), in recognition of his groundbreaking research in the field of Neurohumanities Lab. The award-winning project involved a team of esteemed researchers, including Dr. Mauricio Ramírez and Dr. Lozoya Santos, from both the engineering and humanities schools.

Congratulations to Dr. Cebral and his team for their exceptional work, which has pushed the boundaries of science and technology, and contributed to the advancement of the field of Neurohumanities Lab.

University of Houston

STUDENT AWARDS

Sarah Wong

Congratulations to Sarah Wong (UH BRAIN REU student) for winning the first-place award for the best senior thesis project with her concussion diagnosis headset.

Your hard work and dedication have paid off, and we are sure this achievement will be the first of many in your future endeavors. Well done!

BRAIN RECENT GRAD

I aspire to design medical devices in the future. I am a stroke and lupus survivor and my struggles have driven me to use the talents and gifts God gave me in design to help others with medical struggles. The opportunity to work with the Brain Center has brought me several steps closer to my aspirations.

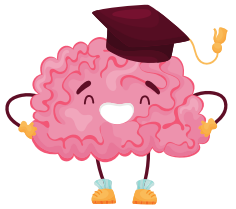
Meet Sarah Wong, our recent grad who has been actively involved in Non-Invasive Brain Machine Interface Lab at the BRAIN Center. Sarah has earned a Bachelor of Science in Industrial Design, specializing in Industrial and Product Design, with an impressive GPA of 3.84. As an Industrial Design major, Sarah has been passionate about creating medical devices that can help individuals with medical struggles.

During her time at the BRAIN Center, Sarah has been -involved in numerous projects that showcase her incredible talent and dedication to her work. For instance, she has played a key role in the development of NeuroExo, a non-invasive EEG headset that connects to a brain-controlled robotic rehabilitation arm to assist stroke survivors in regaining their arm movements. She has also contributed to the development of PLEGS, an exoskeleton that helps children with cerebral palsy. In both projects, Sarah has been instrumental in creating prototypes that have been used for testing and research purposes.

Sarah's hard work and dedication have not gone unnoticed, as she has received several awards and scholarships for her outstanding achievements. She has published a paper titled " Design and validation of a low-cost mobile EEG-based Brain-Computer Interface", showcasing her expertise in the field. Her involvement with the BRAIN Center has provided Sarah with invaluable experience in participant interactions, design coordination with engineers, and 3D printing and prototyping experimentation and exploration. Her eagerness to learn and willingness to take on new challenges have made her an indispensable part of the team.

In the future, Sarah aspires to design medical devices that can help individuals with medical struggles, which stems from her own personal experiences as a stroke and lupus survivor. Her involvement with the BRAIN Center has brought her several steps closer to her aspirations and has prepared her well for her future career.

Congratulations, Sarah, on all that you have accomplished so far, and we wish you nothing but the best as you continue to pursue your dreams. We are confident that you will achieve great success in the future!



BRAIN RECENT GRAD

Congratulations to Derek Huber, a recent graduate from the College of Natural Sciences and Mathematics (NSM) at the University of Houston, who has been making waves at the BRAIN Center with his incredible work in the Non-Invasive Brain Machine Interface Lab. As an undergraduate majoring in biology, Derek has already accomplished a great deal in his academic and professional career.

Apart from his work at the BRAIN Center, Derek has also been involved with the American Chemical Society as a tutor of general chemistry 1 and 2. He has received the Academic Excellence Scholarship from UH and has even published a pre-print article titled "Mobile brain imaging in butoh dancers: from rehearsals to public performance"

Derek's primary project at the BRAIN Center has been the "LiveWire" Brain on Dance project, which involved real-time EEG collection methods to capture the brain activity of two dancers during rehearsals and performances of the piece. Derek's role in the project has been to denoise the raw data and conduct subsequent analysis to discover neural communication patterns between and within subjects during creative expression. He has also led the data collection process for "The Slowest Wave" and "Diabelli 200", which are similar in nature to "LiveWire".

Through his work at the BRAIN Center, Derek has presented his research at multiple conferences, which has helped him grow as a professional in this field and given him the opportunity to speak about the projects he has led.

The experience he gained from the BRAIN Center has expanded his interest in neuroscience and has made him even more curious about continuing to learn more about this field through a medical lens.

Derek's passion for integrating art and science stems from his love of acting. Combining two of his greatest passions has been a magnificent experience for him, and he looks forward to continuing his research remotely after graduation to assist those who continue working on "The Slowest Wave" and "Diabelli 200".

Derek's dedication to his studies and research is truly admirable and undoubtedly will lead to a bright and successful future in medicine. Congratulations once again, Derek, on your impressive accomplishments at the BRAIN Center and your graduation from UH NSM.

BRAIN RECENT GRAD

FRANCISCO VALADEZ ROJAS

Francisco has been granted admission to the Master in Translational Medicine program at **UC Berkeley** for Fall 2023, which is a highly prestigious academic opportunity. This presents an exciting avenue for Francisco to enhance his academic and professional pursuits through the exceptional resources and guidance provided by UC Berkeley

SOFÍA DEL MILAGRO ROJAS ZUMBADO

Sofía has been accepted into the Master in Biomedical Informatics program at **Harvard Medical School** for Fall 2023, a remarkable achievement. This presents a unique opportunity for Sofía to further her academic and professional goals through the exceptional resources and guidance offered by the world-renowned faculty at Harvard Medical School.

MAXINE ANNEL PACHECO RAMÍREZ

Annel has been accepted into the PhD program at the **University of Houston** for Fall 2023, where she will join the Department of Electrical Engineering under the guidance of Dr. Contreras Vidal.

Additionally, she has been awarded the Presidential Fellowships from UH Cullen College of Engineering, further highlighting her academic excellence and potential for future success.

DACIA MARTÍNEZ DÍAZ

Dacia has been accepted into the postgraduate program at the **University of Houston**, starting in Fall 2023. She will be joining the Department of Human Health and Performance, under the guidance of Dr. Charles Layne. This presents an exciting opportunity for Dacia to further her studies and pursue her academic and professional goals.

NEW PUBLICATION

Biomechanics Digital Twin: Markerless Joint Acceleration Prediction Using Machine Learning and Computer Vision

Published in the proceedings of the 2023 IEEE Conference, this research article explores the development of a biomechanics digital twin that predicts joint acceleration without the need for markers. The article, authored by M. O. Candela Leal, D. Martinez Diaz, C. Orozco Romo, A. J. Aguilar Herrera, J. E. Martinez Herrera, A. E. Marin Ramirez, L. O. Santos Cruz, C. F. Cruz Gomez, S. X. Carrillo Ruiz, E. A. Gutierrez Flores, K. L. Rodriguez Hernandez, E. A. Delgado Jimenez, R. A. Ramirez Mendoza, G. Presbitero Espinosa, J. J. Lozoya Santos, and M. A. Ramirez Moreno., details the use of machine learning and computer vision to accurately predict joint acceleration, which could have significant implications for the field of biomechanics.

Read More

Vehicle and Driver Monitoring System Using On-Board and Remote Sensors

This research article, authored by Andres E. Campos-Ferreira, Jorge de J. Lozoya-Santos, Juan C. Tudon-Martinez, Ricardo A. Ramirez Mendoza, Adriana Vargas-Martínez, Ruben Morales-Menendez, and Diego Lozano, presents a vehicle and driver monitoring system that utilizes both on-board and remote sensors. The system aims to improve driver safety and vehicle efficiency by monitoring driver behavior and vehicle performance in real-time.

Read More

Mobile brain imaging in butoh dancers: from rehearsals to public performance

Authored by Constantina Theofanopoulou, Sadye Paez, Derek Huber, Eric Todd, Mauricio A. Ramirez-Moreno, Badie Khaleghian, Alberto Muñoz Sánchez, Vangeline Gand, and José L. Contreras-Vidal, this pre-printed article published on bioRxiv explores the use of mobile brain imaging to study brain activity in butoh dancers during rehearsals and public performances. The authors, who represent a collaboration between the University of Houston and Monterrey Institute of Technology and Higher Education, present their findings and discuss the potential applications of mobile brain imaging in the performing arts.

Read More

Brain-computer interface enhanced by virtual reality training for controlling a lower limb exoskeleton

Authored by Laura Ferrero, Vicente Quiles, Mario Ortiz, Eduardo Iáñez, Ángel Gil-Agudo, and José M. Azorín, this article published in the journal iScience presents an innovative study on brain-computer interface (BCI) technology enhanced by virtual reality (VR) training for controlling a lower limb exoskeleton. The research team explores the potential of this novel approach in assisting individuals with lower limb impairments to regain mobility and independence. The study, conducted by a collaboration between researchers from various institutions, sheds light on the promising applications of BCI and VR in the field of neurorehabilitation. The findings contribute to the growing body of knowledge aimed at improving the quality of life for individuals with mobility limitations.

Read More

MIND IN MOTION

INSIGHTS FROM A RECENT BRAIN SCIENCE SYMPOSIUM

THURMON LOCKHART PRESENTS GROUNDBREAKING RESEARCH AT NIH WORKSHOP

In a recent milestone event, Dr. Thurmon Lockhart (ASU BRAIN Faculty), a distinguished expert in neurorehabilitation and computational methods, captivated audiences as a speaker at the NIH Brain Behavior Quantification and Synchronization Workshop. The workshop, titled "Brain Behavior Quantification and Synchronization: Sensor Technologies to Capture the Complexity of Behavior," was held at the renowned Natcher Auditorium on the NIH Campus in Bethesda, Maryland, on May 2-3, 2023.

In Session II, titled "Multi-sensor Integration for Tracking Movement; Considerations for Comparative and Developmental Studies," Dr. Lockhart shared his groundbreaking insights into the application of wearable sensors and nonlinear computational methods in the pursuit of actionable neurorehabilitation.

With a deep understanding of the intricacies of behavior and a wealth of knowledge in sensor technologies, Dr. Lockhart's presentation was met with great enthusiasm and acclaim from the workshop attendees. His expertise in the field, combined with his innovative approaches, offered a fresh perspective on capturing the complexity of behavior and its implications for neurorehabilitation.

For those unable to attend the workshop in person, the NIH has announced that recordings of the sessions, including Dr. Lockhart's compelling presentation, will soon be made available. This exciting development will ensure that his valuable insights reach a broader audience and contribute to the ongoing advancements in the field of brain behavior quantification.

Source: NIH Workshop Agenda

MILTON CANDELA PRESENTS "COMPUTER VISION AND FACIAL RECOGNITION" AT UANL COMPUTING SEMINAR

We are thrilled to announce that Milton Candela, BRAIN Research Assistant at TEC, delivered an enlightening talk at the Computing Seminar hosted by the esteemed Universidad Autónoma de Nuevo León (UANL) in Monterrey, Nuevo León, México. Taking place on April 24th, 2023, at the UANL FCFM (Facultad de Ciencias Físicas y Matemáticas), the seminar provided a platform for Milton Candela to share his expertise.

Titled "Computer Vision and Facial Recognition," Milton Candela's conference delved into cutting-edge research and offered valuable insights into the latest advancements in computer vision techniques. Attendees had the privilege of exploring the intricacies of facial recognition algorithms and their practical applications.

We take great pride in Milton Candela's exceptional contribution, inspiring the audience at the Computing Seminar. UANL's commitment to fostering innovation in computing is commendable, and events like these play a crucial role in advancing the field.

OUR TEAM

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JL Contreras-Vidal
CENTER DIRECTOR | UH Site Director

Marco Santello
CO-CENTER DIRECTOR | ASU Site Director

INTERNATIONAL AFFILIATE SITE DIRECTORS

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