FIRST PLACE

Team Members:
Andres Marin (Artificial Intelligence), Dannie Martinez (School Psychology), Vishal Kothavade (Electrical Engineering), Keren Mansbach (Master of Business Administration), Kelly Simmons (School Psychology)

Project Title:
Improving Mental Healthcare Access for People Experiencing Homelessness (PEH): Reducing Stigma, Miscommunication, and Implicit Biases through a Community-Based Research Approach and AI-Driven Training Solution

Abstract:
Approximately 1 in 5 adults in the United States experiences a mental health disorder, yet only 40% seek treatment. The risk of mental health disorders is even higher among people experiencing homelessness (PEH), with an estimated 67% of PEH affected (Link & Phelan, 2001). Despite the urgent need for care, many PEH face additional barriers in accessing mental health services, including the lack of affordable care, provider shortages, miscommunication, and stigma. Implicit biases and microaggressions from mental healthcare providers (MHPs) exacerbate these challenges, as they often unintentionally reinforce prejudices and stereotypes (Corrigan, 2004; Greene et al., 2007; Vela et al., 2022). These biases create a cycle of mistrust and reluctance among PEH to seek essential mental healthcare services, worsening their overall health outcomes.

This project aims to improve access to mental healthcare for PEH in San Antonio by addressing implicit biases and microaggressions in healthcare settings. Using Community-Based Participatory Action Research (CBPAR), this study will involve PEH directly in the research process to understand their lived experiences with MHPs and identify instances of perceived bias. Semi-structured interviews and focus groups will be conducted with a sample of PEH to explore their interactions with MHPs, highlighting recurring issues such as stereotyping, dismissive language, and assumptions about their behaviors (Shah & Bohlen, 2023).

The data will be analyzed using thematic analysis with inductive coding, enabling the identification of key themes contributing to a lack of trust in healthcare settings (Douglas, 2011; Mohajan, 2022). The findings from the CBPAR process will inform the development of an AI-powered Virtual Reality (VR) training tool for MHPs. This training tool will utilize a fine-tuned Large Language Model (LLM) optimized through Reinforcement Learning from Human Feedback (RLHF), based on real-world data collected from PEH. The AI Agent, which will embody a houseless persona, will interact with providers in dynamic, immersive dialogues, providing real time feedback on their language and identifying biased behaviors (Animashaun et al., 2024). The VR experience will allow providers to experience firsthand the impact of their communication, offering alternative responses to reduce stigma and fostering more empathetic and effective interactions with PEH (Kolb, 2009).

The project's goal is to create a scalable, immersive training solution that will help mental healthcare providers recognize and reduce their implicit biases, leading to improved

communication and better access to mental health services for PEH. The incorporation of AI driven simulations and CBPAR insights will ensure that the training is both realistic and responsive to the unique needs of PEH, ultimately contributing to a more inclusive and accessible healthcare system. The project draws on the expertise of a transdisciplinary team, including professionals in electrical engineering, artificial intelligence, psychology, and business, to develop a comprehensive and effective solution to address the healthcare needs of marginalized populations.

SECOND PLACE

Team Members: Mariel Ortega (Environmental Science), Dakota Maas (Anthropology), Andrew Smith (Anthropology), Anna Tolley (Anthropology), Santiago Sobrino Fernandez (Anthropology)

Project Title:
Edwards Aquifer Discovery Camp

Abstract:
The Edwards Aquifer Discovery Camp is a four-week educational program designed to address the communication gap between water conservation efforts and public understanding among San Antonio's youth. Developed in partnership with the Edwards Aquifer Authority Education and Outreach Center (EAA-EOC), this summer camp targets 3rd-5th grade students, or "Aquifer Scouts," to promote environmental stewardship, water resource awareness, and transdisciplinary knowledge. Through a unique blend of ecological science and anthropology, the camp aims to educate participants on the ecological, historical, and cultural significance of the Edwards Aquifer, a vital hydrological system that provides clean water to San Antonio and surrounding communities.

The camp's primary objective is to foster a deeper understanding of the Edwards Aquifer among young San Antonians, inspiring them to view water conservation as an integral part of their daily lives and future responsibilities. By combining ecological science with anthropological insights, we present a holistic view of conservation that considers both natural ecosystems and human cultural connections to the environment. The curriculum aligns with Texas Essential Knowledge and Skills (TEKS) standards and covers four main themes: Geology, History, Life, and Water. This approach ensures that participants not only gain knowledge but also develop a sense of responsibility for the aquifer and the broader environment.

The camp's structure includes interactive, hands-on activities, such as group projects, field observations, and creative exercises documented in personal notebooks. "Scout Stickers" are awarded to encourage engagement and critical thinking, while daily recaps and presentations by Scouts enhance communication and leadership skills. At the end of the program, Scouts will demonstrate their learning through projects that showcase their understanding of the aquifer's ecological and cultural importance and propose solutions to water conservation challenges.

The Edwards Aquifer Discovery Camp benefits both participants and the broader community. By educating children on the importance of local water resources, the program aims to instill lifelong environmental values and encourage the adoption of sustainable practices within their families and communities. Studies on environmental education indicate that early exposure to stewardship principles increases the likelihood of responsible resource management in adulthood. Additionally, by bridging the gap between scientific and cultural perspectives, the camp models a transdisciplinary approach that encourages collaboration and respect for diverse knowledge systems.

The significance of this project extends beyond individual participants, as it seeks to build a generation of environmentally conscious citizens equipped with the knowledge and skills needed to address future conservation challenges. Furthermore, by providing access to free, quality educational programming, the camp supports families in San Antonio, offering a valuable resource that alleviates childcare costs and fosters social interaction in a safe learning environment.

Overall, the Edwards Aquifer Discovery Camp represents an innovative approach to conservation education, merging ecological science with anthropological insights to create a comprehensive learning experience. By empowering San Antonio's youth with knowledge of their natural environment and the importance of water conservation, this program has the potential to inspire positive change in both the local community and beyond, fostering a legacy of environmental stewardship for generations to come.

THIRD PLACE (tie)

Team Members: Ayda Eghbalian (Computer Science), Ebrahim Mellatdoust Pordel (Electrical Engineering), Mehdi Torbat Esfahani (Civil Engineering), Alireza Ghavidel (Civil Engineering), Nazanin Basiri (Technology Entrepreneurship & Management)

Project Title:
Enhancing Real-Time Classroom Communication for Students with Autism Using Advanced Artificial Intelligence

Abstract:
This project develops an artificial intelligence (AI)-based system that facilitates proactive communication between students with autism and educators. By using real-time body pose prediction, the system detects concerning behaviors from the students and alerts the instructor of the class where the concerning behavior is observed, enabling timely intervention. This transdisciplinary project draws on expertise from computer science, electrical engineering, artificial intelligence, AI adoption in education, and safety automation to address communication deficits and enhance the well-being of students with autism in academic environments.

Studies indicate that 1 in 36 U.S. children in the United States are diagnosed with autism spectrum disorder (ASD). Distressingly, less than 39% of these students complete their higher education degrees, largely due to the communication challenges they face. These challenges can prevent their ability to engage with instructors, collaborate with peers, and access resources effectively, thereby creating barriers to academic success. To address these pressing gaps, this study aims to propose an enhanced communication system by providing a methodology to preserve the integrity of the students' data, predict potential concerning behavior, enable timely support strategies, and ultimately promote an inclusive learning environment for students with autism. The methodology leverages a state-of-the-art artificial intelligence approach and the students' pose data through the Azure Kinect with built-in pose-capturing algorithms to analyze students' pose data in real-time, using a pre-trained prediction model to detect concerning behaviors, while ensuring ethical participant recruitment and a commitment to privacy and individual rights. The system will be accompanied by comprehensive guidelines for educators on appropriate intervention strategies when alerts are received, ensuring consistent and effective responses to imminent risks.

Finally, the feedback-based data will be used to fine-tune the existing pre-trained pose prediction model, enabling the detection of common self-harming behaviors in individuals with autism. This iterative, feedback-driven approach will yield invaluable insights to promote a safer and more inclusive learning environment. In conclusion, the successful implementation of this system could serve as a model for educational institutions, potentially transforming how communicational support is provided to students with autism and ultimately improving their academic outcomes and retention rates while creating a more equitable, supportive educational ecosystem that empowers all students to thrive.

THIRD PLACE (tie)

Team Members: Mansi Joshi (Environmental Science and Engineering), Veena Prasad (Developmental and Regenerative Sciences), Kashfia Sharmin (Data Analytics)

Project Title:
Improving Communication in Healthcare for People with Speech and Hearing Impairments

Abstract:
This project aims to improve communication challenges faced by patients with speech and hearing impairments in healthcare settings. Effective communication between healthcare professionals and patients is crucial for quality care, accurate diagnosis, comfort, and informed decision-making. However, studies show that these aspects of healthcare are often negatively impacted for patients with speech or hearing impairments. By understanding where communication breakdowns occur and leveraging technology, we aim to mitigate these challenges and improve patient experiences and outcomes. The objectives of this project are to identify where gaps in communication arise throughout the healthcare process from intake to diagnosis, treatment plans, instructions, followup, and overall care satisfaction. To bridge these gaps, we propose creating a digital communication portal to facilitate interactions between patients and healthcare providers. Importantly, we will continuously collect data, analyze it, and share findings with those who can implement changes to improve these processes. Feedback will also be used to refine and enhance the portal. Initially, we will identify key points of communication breakdown using data analytics. At the same time, we will develop and implement a digital communication portal that includes accessibility features for patients and healthcare providers, such as text-to-speech, speech-to-text, pictorial representations, and online chat. We will evaluate the portal's effectiveness through both qualitative and quantitative feedback from patients and healthcare providers. Additionally, we plan to use machine learning and natural language processing (NLP) techniques to classify interactions, identify risk factors, and predict potential communication issues. This approach will allow us to gain deeper insights and visualize data to inform healthcare policy and decision-makers. The potential impact of this project is significant. By addressing communication barriers for speech and hearing-impaired individuals, we can improve patient engagement, enable more accurate diagnoses, and enhance treatment planning by empowering patients to be more involved in their care. The project could also reduce unnecessary healthcare visits and associated costs, with the possibility of widespread adoption to improve healthcare communication on a larger scale.

This proposal is a collaborative effort between a data scientist, an environmentalist, and a biologist with input from Dr. Gawlik, a practicing speech pathologist and professor at UT Health San Antonio. Our collaboration combines data science with real-world insights and expert understandings, and we believe that further work with healthcare professionals will lead to impactful solutions. The project aligns with UTSA's strategic goals by promoting inclusivity in healthcare, advancing technological innovation, and fostering collaboration. We hope that through this project, we can create a model for inclusive healthcare communication that can be adapted and implemented in diverse healthcare settings, ultimately transforming patient experiences and outcomes.