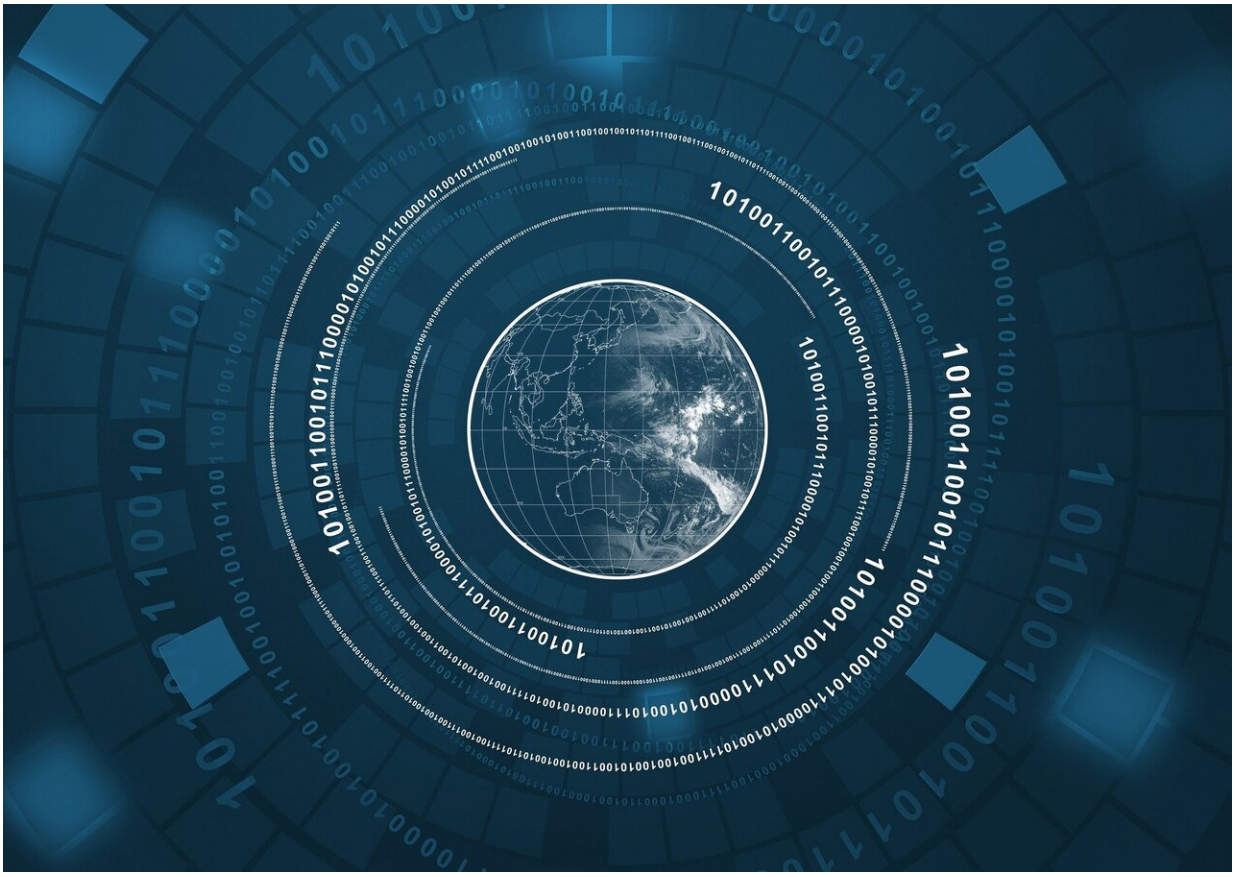
Team builds personal AI for teaching kids living on autistic spectrum

May 18 2021, by Milady Nazir



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UTSA has established a wearables and artificial intelligence laboratory to provide precision treatment plans to improve learning among those

diagnosed with autism spectrum disorder (ASD).

Researchers will automate data collection and analysis of behavioral sensing data that can be used as an AI-augmented treatment specializer. The AI-augmented learning and applied behavior analytics ABAi Lab is a joint venture between the Child and Adolescent Policy Research Institute (CAPRI) and the Secure AI Laboratory for Autonomy (AILA), both at UTSA.

These results could be used in AR/VR, gameplay and other digital platforms to create greater access to treatments and standardize them.

"With applied behavioral analysis, we are limited by the data that a human observer can collect while also being present and interactive with the child," said Leslie Neely, associate professor of educational psychology in the College of Education and Human Development at UTSA and director of CAPRI. "There is a huge load on our clinicians to process information and prepare an intervention for the kid. The AI takes this load off."

According to autism research, diagnosing and treating ASD can be difficult since there is no medical test. Doctors or behavior analysts rely on a child's behavior and development to make a diagnosis and treatment plan, yet the process to get a result and provide behavioral treatment relies on lengthy data collection, observation, treatment and office time for the specialist to engage with the child. Moreover, medical training in ASD itself is varied and not uniform which can result in differing treatment plans and misdiagnosis.

Although ASD has no cure, the literature shows that early diagnosis helps improve behavioral outcomes with those living with the condition. There are several types of treatments such as applied behavioral analysis, occupational therapy, speech therapy, physical therapy, and

pharmacological therapy available.

"The smart health and behavioral sensing platform will make the recommendation for an intervention based on what we know works best for the child's profile," Neely explained. "Then the clinician will implement it. We don't have to disengage (from interaction) to take data or disengage to evaluate data. We amplify the use of people where it matters."

The architecture of the ABAi Lab uses invasive and non-invasive sensors, such as Microsoft head gears, video cameras and wearables to capture data such as extremity movements, speech tone, and heart rate from children. This data is then analyzed along the four dimensions used to recognize ASD: repetitive behavior, delayed and disoriented language, impaired social interaction, and restricted range of interest. The algorithm then creates a parameter required to define a personalized treatment plan and activities for the child to continue reinforcement and learning.

UTSA researchers have already installed the sensors and cameras and have been testing the AI. For the summer, the platform will first focus on sleep patterns and how they predict daytime behaviors in children with ASD.

Autism spectrum disorder occurs in about one in 54 children, according to the Centers for Disease Control and Prevention. The condition appears regardless of racial, ethnic and economic backgrounds. However, it's four times more prevalent with boys than girls. People with ASD have different ways of learning, paying attention, or reacting to things. Signs of ASD begin during early childhood and is a lifelong condition.

This smart health and behavioral sensing platform can be used in

outpatient clinics and schools; integrated into telehealth platforms to facilitate service access to those living in rural and deprived services areas; and leveraged in emergency situations such as the ongoing COVID-19 pandemic. The processed data and results could be used to dynamically influence the virtual environments, learning structures, precision of treatment plans, effectiveness, and incorporation of AR or VR digital platforms to promote greater access to intervention and generalization of treatment effects.

"AI doesn't replace the human here. In behavioral therapy you need the human connection," Neely said.

The ABAi platform was developed alongside Shadi Ghafghazi, Amarie Carnett , Arun Das, and associate professor of computer science and information technology Paul Rad, director of the AILA Lab.

UTSA plans to have more results by the end of the summer in order to bridge the knowledge gap in how AI can improve personalized treatment. Funding requests have already been submitted to the National Science Foundation for additional technological support. This work between CAPRI and AILA is an example of the interdisciplinary approach that's part of UTSA's vision to solve the world's grandest challenges.

Provided by University of Texas at San Antonio