

Imìsí 3D

Case study

Name of initiative

AutismVR

Implementing organization

Imìsí 3D

Initiative type

Artificial intelligence (AI) system

About the initiative

AutismVR is a virtual reality and AI-based game that helps young users and adults simulate interactions with children affected by autism spectrum disorder. The objective of the game is for users to better understand how to effectively communicate with autistic children, and ultimately, improve methods to support their needs and development.

Alignment with UNICEF Policy Guidance on AI for Children

The initiative has aimed to:

- Support children's development and well-being
- Ensure inclusion of and for children
- Prioritize fairness and non-discrimination for children

Location

Nigeria

Status

Prototype



Overview

AutismVR is a virtual reality (VR) game where players learn how to communicate more effectively with children affected by autism spectrum disorder (ASD). The game, which utilizes artificial intelligence (AI) techniques, is designed for neurotypical¹ people who may be in frequent contact with children living with ASD, such as parents, siblings, or caregivers.

AutismVR was created to address the dearth of awareness and support related to ASD in Nigeria. Major gaps in knowledge about autism and the care of children with ASD result in significant demands and burden placed

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on families of persons living with ASD. In particular, there is little understanding as to what this spectrum of neurodevelopmental disorders entails, and how to communicate effectively with children affected by ASD. There is significant stigma, prejudice, discrimination, and maltreatment of children and people living with ASD – severely and negatively impacting their development potential, their career prospects and entire lives.

By creating an open-source, easily accessible game, AutismVR aims to reduce stigma, educate a general audience of Nigerians about ASD, and improve communication between neurotypical people and children with ASD. Currently in the prototype phase, AutismVR plans on launching the first level of its game, *Greeting*, in 2021.

¹ Individuals not displaying or characterized by autistic or other neurologically atypical patterns of thought or behaviour. See this article for more information.

Context and project origins

According to 2019 clinical and developmental studies, [2.9 per cent](#) of children aged 3-18 are affected by ASD in Nigeria. A high percentage of the country's population is below the age of 14 (approximately [44 per cent](#)), which implies that a greater number of Nigerians are suffering from childhood autism compared to other countries. Even more sobering facts in this context: the average age of ASD diagnosis hovers between [7](#) and [8](#) years of age, compared to 4 years of age for more affluent countries. About half of all Nigerian children with ASD are also diagnosed with developmental disabilities, suggesting that only the most severe cases of ASD are diagnosed, while more moderate cases go undetected.

Many children living with ASD in Nigeria, and across Africa, remain [undiagnosed](#) due to the lack of mental health care resources and the general lack of awareness about neurodiversity. In other words, not enough clinicians have the skills or experience to identify the condition. Strategies are needed to improve identification, diagnosis, management and support delivery for children with ASD by improving access to information and training with community engagement.

In addition to a lack of available and accessible screening and diagnostic tools, another significant set of factors behind ASD underdiagnosis is cultural: neurodivergence and mental health conditions in sub-Saharan Africa are often associated with stigma and prejudices. The stigmas associated with ASD can cause significant emotional and economic burden, distress and isolation, discrimination and maltreatment to children with autism as well as to their caregivers. Clinical experts have [documented](#) the discriminatory comments that parents of children living with ASD may face, leaving families with few opportunities for support and advocacy, and preventing many affected children and adolescents from benefiting from medical intervention or special education services. Furthermore, neurologically atypical patterns of behaviour displayed by persons living with ASD may be attributed to [supernatural causes](#). Even health workers may exhibit [distrust](#) and associate ASD features with [curses](#) (such as the belief that the affected child is possessed by malevolent spirits, targeted by enemies, or is the victim of lineage curses). Caregivers may then fear [communal reprisals](#) against their children and may not be [aware](#) of how ASD can be managed.



Imisi 3D, an African extended reality (XR) ecosystem developer in Nigeria, is aiming to help increase societal awareness and acceptance of childhood autism, and improve interactions with children living with ASD within their families and local communities. They are actualizing this intent through their new product, AutismVR. The goal is for end users to gain a better understanding of the range of behavioural capacities and challenges that characterize autistic children, and subsequently, improve ways to support their needs and development.

Conceived in 2018, the concept around AutismVR was born out of the interdisciplinary collaboration between Imisi 3D and [AskToks.com](https://asktoks.com), a mental health consultancy that specializes in ASD. Following its conceptualization, the project has been executed as a community project alongside a team of volunteers from different disciplines. AutismVR plans to be released as a voice driven VR game, designed for the Google Cardboard, a low-budget VR device that consists of a mounted cardboard headset into which a smartphone is inserted, making the game as accessible as possible in Nigeria and beyond. The first level of the game – *Greeting* – will be available on [GitHub](https://github.com) as an open-source project while the team hopes to build out *Play*, the second level in 2022. The goal of the project is for the game to become available to Nigerians soon after. The second level will be built for the Oculus Quest 2 VR headset, a platform which will allow for the required physical interaction.

About the AI system

The first level of AutismVR focuses on engaging a child who is neurodiverse in a culturally relevant setting for Nigerians – showing participants how ASD can manifest itself in situations common to their shared experiences. The game operates as a voice-driven experience, where players initiate a greeting or a conversation to engage a fictional character with ASD – either a young boy, Tunde, or young girl, Ngozi. The character is “non-playable,” which means that the character is not under the control of the player and therefore the crux of the game is to elicit Tunde’s or Ngozi’s response in a way that may lead to further communication.

The voice-driven immersive experience is based on natural language processing (NLP), an AI process that allows computers to identify text and spoken word. The Imísí 3D team chose to use IBM Watson (a tool commonly used to create text for chatbots) to develop appropriate responses for the non-playable character based on the user’s dialogue. The design team opted to use immersive voice-driven gaming to create the most realistic learning experiences. The use of NLP through natural voice interaction increases the feelings of presence and immersion for the user. Ultimately, Imísí 3D’s goal is to provide a relatively seamless transition from the gaming experience to a real-life encounter.

Through the design process, Imísí 3D has been focused on making AutismVR accessible to a large audience in Nigeria, specifically to 50 per cent of the English-speaking caregivers and family members of children with ASD. Based on current Nigerian population data, approximately 1.5 million persons, including children, are affected with ASD.² Ideally, the team hopes to reach not only English-speaking Nigerians, but also members of the English-speaking African diaspora, who may lack access to health care systems or may have ingrained cultural notions about ASD that could be addressed through AutismVR.

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2 Estimate based on Statista 2021 population data for Nigeria at approximately 210 million.



Application of child-centred requirements

While developing AutismVR, Imisí 3D has aimed to promote three child-centric requirements that align with the [UNICEF Policy Guidance on AI for Children](#), namely: supporting children's development and well-being, ensuring inclusion, and prioritizing fairness and nondiscrimination.

Support children's development and well-being

[Surveys](#) have documented that not enough clinicians in Nigeria have the skills or experience to identify ASD. This puts a strain on the limited number of caregivers who specialize in ASD, making it critical to increase local caregivers' (i.e. family members) abilities and knowledge to effectively engage with children with ASD. Research and practice have also [demonstrated](#) the importance of empowering and supporting parents through approaches that use behavioural and social skills to attend to the complex needs of children living with ASD.

In this respect, the interactive and communication skills taught through AutismVR are vitally important. Such skills should allow non-autistic young users and adults, notably siblings and caregivers, to better engage with children with ASD, and therefore nurture them more effectively. Ideally, this increase in awareness and communication should reduce the stigma that children with ASD face, helping them lead lives with fewer instances of discrimination. By creating a game that helps reduce ASD stigma and focuses on developing effective, concise communication, Imisí 3D contributes to the development and well-being of children with ASD.

Ensure inclusion of and for children

The Imisí 3D design team focused on presenting the non-playable characters with ASD in an accurate and nonjudgmental light. To achieve this careful representation, Imisí 3D conducted interviews and testing sessions with children with autism and their caregivers, integrating their feedback to create and refine non-playable characters that accurately reflected their experiences.



Specifically, this feedback was critical to improving how children with ASD are represented in the game's script and videos based on bodystorming.³ The feedback received from autistic children and their caregivers was also important to help refine how the child character behaves and responds in the immersive game. In this inclusive process, Imisi 3D followed experts' recommended [methods](#) and approaches for engagement, such as using a communication partner, often a parent, as a proxy to elicit feedback from children with ASD.

To achieve an accurate, evidence-based portrayal of ASD in children, the project team includes includes two behavioural analysts, who have worked on all aspects of the game's content involving ASD and neurodiversity. The interdisciplinary knowledge that supported the representation of ASD in the game has allowed players to clearly understand how a child with ASD might communicate, thus helping the players improve their interactive skills and experiences with real children who have ASD.

³ Bodystorming is a set of techniques to brainstorm using the body, for instance by acting out stories and scenarios to make players think further about complex situations.

Prioritize fairness and non-discrimination in children

In Nigeria, health care workers often play a pivotal role in offering medical advice and providing health care related information to people in their immediate community. Some health care workers' cultural perspectives or beliefs that ASD can be caused by malevolent forces have been shown to influence the help-seeking behaviour of parents of children with ASD.

In this context, and by building on the feedback from end users, the design team at Imisi 3D is ensuring that AutismVR clearly informs the general audience of players about neurodiversity, in particular the spectrum of neurodevelopmental disorders involved in ASD. For instance, the pre-play information guide carefully emphasizes that children with ASD can exhibit a range of behaviours, including what may seem like inappropriate physical conduct (i.e. jumping at once, putting strange objects in their mouths, or waving their hands for no discernible reason, etc.) as well as withdrawn demeanor (i.e. seeming to ignore the player). A post-play questionnaire is another way to assess users' understanding of the complexity and diversity of behaviours and disorders involved in ASD. The responses to these questions can help provide an indication of the efficacy of the AutismVR gameplay as a tool to enhance knowledge and awareness about ASD. Should the feedback result in the identification of gaps in the game design, this upgrade will be planned for future iterations.

Imisi 3D is also conscious of the cultural misconceptions that may be associated with gaming. For example, gaming can be linked to 'play', which could be considered an activity that is not serious. The concern is that issues related to ASD, which can present very real and pressing difficulties for families, might be addressed in a light-hearted way. The start-up has therefore paid particular attention to the framing and language used throughout the game in an effort to mitigate any perception that neurodiversity is being approached or treated lightly.

AutismVR is explicitly designed to help neurotypical individuals learn how to communicate with children with ASD. The main lesson the team wishes to impart is that better awareness, understanding and empathy help individuals support and connect with people who seem different to them. In future iterations of the game, a non-playable character, representing a neurotypical parent, will be included to share lessons on the values of fairness, respect and non-discrimination, which are critical when interacting with neurodiverse children.



Results, findings and impact

The first round of user testing on AutismVR was carried out in March 2021. The main issue that surfaced was the difficulty users faced in following the instructions to interact with the non-playable character. Users often attempted to communicate with Tunde or Ngozi by using everyday language in Nigeria, but counter to the game's lessons. They would use phrases such as, "Don't you want to be my friend? I have sweets for you," to try and solicit a positive response from the non-playable character. The game developers, however, wished to teach neurotypical users to communicate using simple and concise statements. After testing, the team decided to include more direct guidance, oral instructions and visual aids, to help steer users in the right direction.

Additionally, the Oculus Rift headset (which was used for the first prototype) is not readily accessible to the target demographic in Nigeria. As a result, Imisi 3D is working to release its product on Google Cardboard, which incorporates smartphones, eliminating the need to buy expensive tethered headsets which require VR-ready computers (such as the Oculus Rift).

Lessons learned and future challenges

Building on the proactive thinking from the design team and behavioural analysts, certain changes were implemented early in the design process. One of these improvements was the inclusion of both female and male non-playable characters with ASD to ensure that users didn't consider autism as a "boy's problem" or a "girl's problem" respectively.

During testing, users frequently mentioned that they felt restricted by the gameplay, particularly by the means in which they could elicit responses from the character. Therefore, the team opted to add additional instructions, narration, and clarity to the game in the form of pre-play information, which helps players understand the behaviors that occur, and what a player can do to elicit a positive response. By teaching the players a base level understanding of ASD, the team could effectively point them in the right direction, reducing 'missteps' or unsuccessful speech interaction with the non-playable character.

Significant challenges remain with the NLP's comprehension of accents, including Nigerian and other African accents. Therefore, Imisi 3D is continuing to test IBM Watson to determine how successful the game's implementation will be with their target demographic. The team is working on training the NLP to elicit a greater variety of responses to user dialogue and looks forward to developing the next level of the game by 2022.

About this case study

This case study is part of [UNICEF's Artificial Intelligence for Children project](#), which aims to better understand how AI-powered technologies can protect, provide for and empower children. Through a partnership with the Government of Finland, the project developed a draft [Policy Guidance on AI for Children](#), which contains practical recommendations and principles for governments and industry to create child-centred AI policies and systems. In order to inform and improve future versions of the guidance and inspire others, organizations were selected to pilot the guidance and share their diverse experiences to illustrate how AI-based initiatives could be designed to be more child-centred. The approaches taken, lessons learned and insights gathered will be one contribution to the global effort towards AI policies and systems that support children's development. View all of the case studies on our [website](#).

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