Bio

Javier Alejandro Rojas Villamil has a B.A. (Hons) in Psychology from the National University of Colombia (awarded for the best research thesis in Psychology), an M.A. in Social Sciences and Education from the Latin American Faculty of Social Sciences in Buenos Aires (scholarship awarded by the Ministry of Education of the Nation, Argentina). He also has developed game programming skills in Computer Science, and 3D animation and game design skills in Visual Arts at the Memorial University of Newfoundland.

Javier is pursuing an Interdisciplinary PhD at the Memorial University of Newfoundland. He is developing cross theoretical concepts and methodologies from Computer Science, Visual Arts, Medicine, Education, Psychology to construct and validate the effectiveness of Serious Games running in Virtual Reality Environments to evaluate and intervene in game's action of people with Autism Spectrum Disorder (ASD). His passion for contributing to the emergent study field of Serious Games and autism is oriented to develop assistive and comprehensive information technologies for researchers, clinicians, teachers, and families.

Research project background and purposes

The American Psychiatric Association defines the Autism Spectrum Disorder (ASD) as a life-long neurodevelopmental disorder that is characterized by déficits in social communication and social interaction, and are associated with restricted or repetitive behaviours. This disorder manifests itself differently in people depending on the variety of symptoms that are impacted, resulting in a unique profile of strengths and needs for every person diagnosed. ASD manifests itself in different people with a variety of symptoms during their development such as significant social, communication, and behavioral difficulties. The early assessment and treatment effectiveness depends on taking into account that each person with ASD behaves, interacts, communicates, and learns according to their individual dispositions, preferences, and interests. In fact, they act as agents under diverse cognitive styles to face particular challenges in concrete environments. This tremendous diversity of challenges

including conceptual, social, practical, and cognitive skills of people with ASD lends itself to the most recent and novel technological advancement and its promising results to customize ASD assessment and intervention. Some empirical findings in the last two decades have demonstrated the high level of customization and effectiveness in ASD treatment that can be achieved by means of immersive Virtual Reality Environments (VREs) and Serious Games as leading-edge information technologies. Serious Games (SG) are defined as video games designed and applied to purposes other than pure entertainment in diverse research fields. In the case of the present research proposal, the SG development is oriented to assess and intervene in actions performed by people with ASD. This interdisciplinary development will contribute to the Autism Action Plan in Newfoundland as a required comprehensive approach to assess, intervene and support individuals living with ASD in Newfoundland and Labrador (i.e., 1 in 57 approximately that is the highest prevalence rate in Canada).

One of his main research challenges throughout the Interdisciplinary PhD program is oriented to develop innovative Reinforcement Learning (RL) techniques to build and optimize Artificial Intelligence (AI) algorithms based on interdisciplinary data-driven design and programming decisions. Although these RL techniques have been developed in the area of Machine Learning in Computer Science he will develop innovative AI agents optimized into Serious Games by basing such AI algorithms on a comprehensive approach from the interdisciplinary methodologies and concepts used effectively in the assessment and intervention in ASD. Thus, Javier is articulating innovative interdisciplinary approaches that are essential to collect this data through Participatory Design and game sessions with people with ASD to test the logic and variables of the ASD screening and diagnostic tools used under clinical procedures in the clinician's office (e.g., Social Responsiveness Scale adult self-report version (SRS-2), Autism Diagnosis Interview-Revised (ADI-R), Autism Diagnostic Observation Schedule - 2 (ADOS-2), Childhood Autism Rating Scale (CARS), Gilliam Autism Rating Scale - Second Edition (GARS-2)). The data collected also will allow him to test the logic and variables of the Applied Behavior Analysis techniques used with people with ASD in teaching and learning settings (e.g., language training to produce verbal communication, action modeling, naturalistic teaching strategies in customized environmental arrangements such as home, school, and community, peer training, and social skills packages to initiate and respond during social interactions, use of self-management strategies, schedules, scripts, visual supports and story-based interventions as action guidance).

Javier also has the challenge of replicating real-life situations of gamers and their daily places through game actions to achieve a high effectiveness in generalizing game action skills into their daily life. He will use the Participatory Design with people with ASD to create engaging storylines in immersive Virtual Reality environments to achieve high effectiveness if people with ASD are able to generalize game action skills into varied daily actions. The looping and fractal aesthetics are essential to achieve such a gamer engagement since such aesthetics are the preferred by people with ASD so they might engage actively into VR environments in which the AI agents act. So he will use iteration art techniques from the Visual Arts field to design such kind of aesthetics. Engaging VR aesthetics and user confort with such platforms can be tracked by measuring stress hormones using Behavioural Neuroscience methods with assistance from faculty in Psychology. These Visual Arts and Psychology methods are essential to test the AI agents in customized environments that replicate a high diversity of aesthetics preferences and daily actions.

A dream and challenge he has to contribute to develop an interdisciplinary study field at MUN is to create a VR Serious Games laboratory so students from different disciplines and community stakeholders can participate and contribute in diverse ways.