

Matheus Gonçalves Mussi – University of Alberta

Project: *User-centred design of brain-computer Interface systems for children with disabilities*



Biography

Matheus graduated in Control and Automation Engineering at the University of Caxias do Sul, Rio Grande do Sul, Brazil. With the help of data translation skills acquired in High School, he began an early research experience in his undergraduate program with an evaluation method in the area of electrical engineering.

His work with MatLab and statistical processing of data became his first academic writing and presentation, and received the 'Metallurgist, Mechanical and Electrical Industry Syndicate' Excell award at the 'Young Researchers' Encounter 2015. After which, Dr. Tairov and Matheus published the patent for their design.

Santander Bank of Brazil selected Matheus as one of the 100 students to receive the 'Fórmula Santander' Grant for International Studies. With that, Matheus completed an exchange experience the University 'Politécnica de València' in Spain where he attended one semester of engineering classes learning about other cultures and be more proficient in Spanish.

Working in the automobile industry as an intern at Agrale, he had the opportunity to build his technical and business skills in the Electrical Engineering department. He learned about product development, manufacturing, employee management and automobile assembly. As well, he worked with electrical wiring diagrams for trucks, buses, military vehicles and tractors.

As a research Fellow under the supervision of Marilda Spindola, their work on processing information from an electrooculography sensor worn by a patient with paraplegia to control an electric wheelchair received the 'Metallurgist, Mechanical and Electrical Industry Syndicate,' Prize at the 'Young Researchers' Encounter 2018. Matheus's project moved to

Electroencephalography (EEG) signals and his thesis classified Motor Imagery signals from participants without disabilities.

The International Workshop on Assistive Technologies (IWAT 2019) accepted an article based on his thesis and research. Currently Matheus is pursuing a Master's degree at the Faculty of Rehabilitation Medicine which has led him to his current research project.

Project Summary

It is of interest of every child to be able to join groups of friends and play side-by-side with their peers. United Nations provided that all children have the right to play. Within this frame Matheus's research aim is to expand the abilities in children with disabilities using BCI systems that have the potential to benefit people with impairment in the areas of communication and leisure activities. The research attempts to develop a brain-computer interface system that can help individuals with severe physical impairments to execute tasks, such as turning lights on and off or playing a game with a pair.

Matheus's research considers several sessions to collect brain signals that can be processed by "smart computers" so children can play computer games or accomplish environmental control actions. For each child, the experimental setup will be tuned to maximize the system's effectiveness, tracking the children and parents overall experience to improve the process.

The research aims to generate a well-designed system so many children with disabilities can use it in their daily activities, verifying how it works for children, their experience with the technology and what technical/mathematical approaches are more likely to work.