CEREPAD: Assistive Device for Neurological and Musculoskeletal for Spastic Cerebral Palsy Children

Le, Hoang Ha Anh (School: Tran Phu Gifted High School)
Vu , Duc Dung (School: Tran Phu Gifted High School)

This study aimed to develop a device and mobile app for providing comprehensive automatic treatment for spastic quadriplegia, the most severe form of cerebral palsy that requires early intervention and treatment. The CEREPAD device combines various exercises to train multiple muscle groups simultaneously and uses an artificial neural network (ANN) based on GMFM-88 scores to suggest an appropriate treatment strategy. The device was calculated the torque at the 4-hinge frame to figure out the thrust to perform and designed with durable details and appropriate cross-section for mechanical drives, which was tested through more than 200 trials. Field tests were conducted at Hai Phong Children's Hospital by a team of specialists with 33 patients participating, divided into two groups, with 18 participants using CEREPAD and a control group of 15 people using conventional devices. The GMFM-88, VEPs, and EMG records were documented throughout the process to monitor and evaluate the status of patients. After the testing period, the doctors send the data to us to analyze and compare. Results showed that the rehabilitation efficiency significantly improved with the coordination of different exercises using the CEREPAD device and mobile app. As the experimental group had an average increase in score 2.56 times higher than the control group, and their brain had undergone noticeable changes that could be seen through images. The CEREPAD device and mobile app were proven effective, enabling personalized treatment with an easy-to-use platform for caregivers and offering a more comprehensive, effective, and innovative treatment option for spastic quadriplegia.

Awards Won: