FIU Engineering & Computing

Biomedical Engineering

Project Title: Evaluate the role of sensorimotor integration in executing activities of daily living using fNIRS

Students will image superficial cortical brain areas using functional near-infrared spectroscopy (fNIRS) for evaluating the effects of sensorimotor integration. The fNIRS data will be collected while able-bodied subjects are performing activities of daily living (ADL) during two clinically validated assessment instruments: Southampton Hand Assessment Procedure and Activities Measure for Upper Limb Amputees. The long-term goal of this study is to evaluate the effects of sensorimotor **re-integration** in amputees whose sensation is being restored by peripheral nerve stimulation or other noninvasive means while executing ADL. Previous experience in fNIRS data collection and analysis is preferable but not necessary.

Project Title: Prosthetic Alignment and Amputee Balance Training System

Students will collect gait and balance data in healthy non-amputee subjects wearing modified footwear. The modified footwear simulate gait changes induced in amputees due to misalignment of prosthetic foot. The primary goal of the project is to improve the prosthetic alignment process in amputees. In existing clinical practices the alignment process is performed by a combination of verbal feedback between the amputee and prosthetist, and visual inspection of amputee's gait performance. The data collected in this project will be used to develop a method to provide quantitative biomechanical outcome measures that can be used objectively for alignment of prostheses. The data will also be used to develop a biofeedback balance/gait training paradigm in amputees to reduce the fear of loss of balance

Project Title: Non-invasive Electrical Neurostimulation for Sensory Feedback

Students will work in the development of non-invasive neurostimulation strategies such as transcutaneous electrical stimulation (TES) for evoking distally referred sensations. Students will assist in data collection during experimental sessions with healthy non-amputee and amputee subjects to evaluate the perceptions elicited by the stimulation and quantify enhancements in functional discrimination of sensory information and closed-loop prosthesis control capabilities.