Biomedical Engineering
FLORIDA INTERNATIONAL UNIVERSITY

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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: Mechanical egg design and development

Students will design and fabricate a mechanical egg. A mechanical egg is a device that uses variable stiffness to simulate the brittleness of an egg. The goal is to have a device that can be used in an experiment with amputees. The amputees will use their prosthetic hand to pick up the mechanical egg without breaking it. The student will design the mechanical egg. Then the student will 3-D print the design and test it in order to get it ready for the experiments. Previous experience with Solid Works/CAD design is preferable but not necessary. The student will learn how to use Solid Works and how to 3-D print.

Project Title: Sensory and motor perception

Students will study the effect of sensory substitution on sensory perception. Sensory substitution involves providing sensory feedback by vibrotactitle stimuli on the skin. Students will use a vibrotactile array to provide information about objects of different sizes and/or compliance to non-amputee and amputee participants. The goal is to understand if functional sensory feedback can be provided to amputees in the form of vibration to the skin. The significance is that current prosthetic devices do no provide sensory feedback and thus users stand to benefit from this non-invasive technology.