PROJECT TITLE:
A Robotic System for Treadmill Training in Children with Crouch Gait

FACULTY NAME:
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STUDENT NAME:
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TIMEFRAME OF PROJECT:
Start: Summer, 2014
End: Spring, 2016

RESEARCH SUMMARY:
Cerebral Palsy (CP) is a congenital disorder that affects the neuromuscular system, causing muscle spasticity and abnormal muscle development. As a result, the individual’s ability to walk is severely hindered.

During the timeframe, I will develop a robotic therapy for the lower limbs in children with CP that walk with crouch gait. The activities will include programming (using LabVIEW) the cable-driven robotic system to integrate signals from an instrumented treadmill to apply forces to the limbs at the correct times during the gait cycle. In addition, I will design and constructing mechanical mounting and pulley systems for the CaLT, a system of lightweight cables attached to the legs and a motor which applies forces to the cables [1]. The system will 1) apply targeted resistance to the leg during swing and 2) stretch the hamstrings to the maximal length during late swing to retain hamstring length.

For the proposed study, we will develop and test the system in a sample of up to 10 children with cerebral palsy. Our experimental design is a single-session test with and without the robotic system with the intent of demonstrating that the CaLT improves gait kinematics.

RESEARCH OUTCOME:
The custom LabVIEW program has been created during the summer of 2014. The mechanical cable and pulley systems have been mounted, needing proper adjustments and calibration with the software. A pilot test will ensue before testing on children.

LOCATION OF RESEARCH ACTIVITIES:
Integrative Neural Engineering Research Laboratories (INERL) at Marquette University; Cramer Hall, Room 138
COLLEGE RESOURCES:

The motors, drives and computer systems are available and have been used for a different project. Resources are available for additional mechanical and electrical components through the Rehabilitation Engineering Research Center on Technologies for Children with Orthopedic Disabilities, and the Discovery Learning Center.

COMMENTS:

This project is related to the research project entitled ‘Diffusion Tensor Imaging and Restoration of Upper and Lower Limb Function in Children with Cerebral Palsy’. The results of this project will contribute to Dr. Schmit’s ongoing research study investigating the use of robotic treadmill training to improve walking function in children with CP.

WORKS CITED: