Neuromuscular Control for Lower Limb Prosthesis

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Declaration

I certify that this research work titled "*Neuromuscular Control for Lower Limb Prosthesis"* is my own work. The work has not been presented elsewhere for assessment. The material that has been used from other sources it has been properly acknowledged / referred.

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Language Correctness Certificate

This thesis has been read by an English expert and is free of typing, syntax, semantic, grammatical and spelling mistakes. Thesis is also according to the format given by the university.

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Copyright Statement

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Abstract

Transtibial amputees come across various stress related issues. Gait cycle of these amputees vary from a healthy human being due to deviation in stresses primarily related to human ankle. Human ankle biomechanics provides a control platform to analyze these stresses. Deviation in human ankle angles, required torque and positive work done required in various phases of a gait cycle thus becomes a focal point for understanding. Passive ankle foot prosthesis doesn’t provide required work done for the amputee during powered plantar flexion phase of gait cycle since the energy stored doesn’t suffice for the desired outputs therefore a more viable option is the use of powered active ankle foot prosthesis. To design a robust control mechanism for this powered ankle foot prosthesis is of utmost importance since it ensures mimicking human ankle biomechanics of a healthy human being for an amputee as well. Input to this control mechanism rests in understanding the amputee’s intent through neuromuscular EMG (Electromyography) signals. This research thus focuses on simulating a control system for powered ankle foot prosthesis along with neuromuscular control which will result in a natural gait cycle and reduction of metabolic cost of transport (COT) of a transtibial amputee.

Key Words: *Amputee, Gait Cycle, Intent, Metabolic Cost of Transport, Neuromuscular, Prosthesis, Transtibial.*

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