Engineering Education & Leadership

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Chair

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Research Interests: Current research interests lie in four key domains: &lt;br&gt;&lt;br&gt;&lt;br&gt;&lt;br&gt;– specifically I have been investigating how time-varying individual muscle forces, both under normal and abnormal stimulation patterns, contribute to loading variations within the human knee joint (tibial plateau). This research has a direct application in understanding how ACL injuries change the inherent loading patterns on the knee and contribute toward joint degeneration.&lt;br&gt;&lt;br&gt;&lt;br&gt;&lt;br&gt;Ultra-low Cost Prosthetic Components&lt;br&gt;&lt;br&gt;&lt;br&gt;&lt;br&gt;– specifically as it relates to the human elbow, wrist and knee joints. I have sought to investigate the role of individual muscle forces and their subsequent muscle architecture toward both normal and pathological movement and motor control.&lt;br&gt;&lt;br&gt;&lt;br&gt;&lt;br&gt;Musculoskeletal Modeling&lt;br&gt;&lt;br&gt;&lt;br&gt;&lt;br&gt;– This research entails the design and development of a graphical and musculoskeletal dynamic model using 4 degrees-of-freedom at the elbow and wrist joints to study the interaction of the major muscles crossing these joints. This computational model is used to investigate the feasibility of a hybrid optimal control / neural network algorithms to predict joint moments from muscle electrical signals (EMG). The predicted trajectory directs the position of the “Intelligent Prosthetic Arm” to test the reliability of the motion of the prosthetic arm under various tasks.

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