



LOCOS NEWS

Newsletter of the Laboratory for Optimization and Computation in Orthopaedic Surgery
Department of Orthopaedic Surgery, University of Michigan
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Director's Corner

The most exciting development for LOCOS in the last year has been the development of the Michigan Arthroplasty Registry Collaborative for Quality Improvement (MARCQI). I have worked closely with **Dr. Brian Hallstrom** in preparing a proposal to Blue Cross Blue Shield of Michigan (BCBSM) to fund the development of a network of hospitals and providers in Michigan for prospectively following the outcomes of hip and knee replacements, including complications. The objective of the project is to improve quality of health care. In November we learned that BCBSM decided to fund MARCQI. Dr. Hallstrom will be the Director of MARCQI and I will serve as the Technical Director. MARCQI will improve public health and be a wonderful foundation for LOCOS projects in orthopaedic surgery quality improvement.

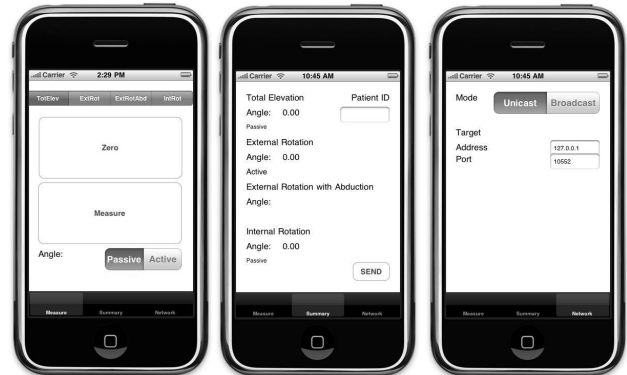
Regards,

Richard E. Hughes, Ph.D.
Director

Current Research Project Updates

iPad and iPod Applications in Clinical Orthopaedic Research

Chester Chan, who is a University of Michigan medical student, has developed iPod and iPad apps for collecting outcomes data in the clinic. The iPad app implements patient questionnaires (SF-12 and Western Ontario Rotator Cuff Index); the iPod app uses the device's triaxial accelerometer to measure arm inclination. Both apps were developed to help assess the outcomes of patients having rotator cuff tears. The image to the right (above) shows screenshots of the iPod app for measuring shoulder elevation using the iPod's triaxial accelerometer.

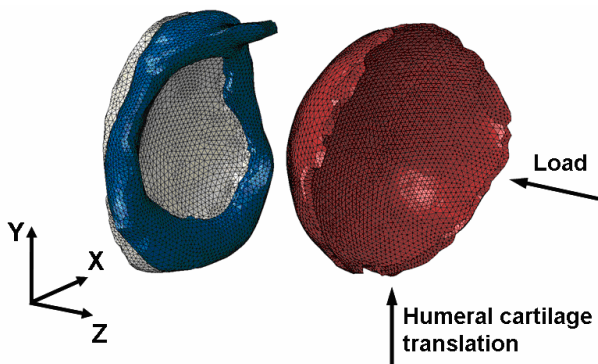


Support Vector Machine Modeling of Rotator Cuff Tear Patients – Who Goes to Surgery?

Patients with rotator cuff tears initially undergo either non-operative management or surgical repair. Typically they are managed non-operatively, and many do well with this treatment. However, some patients who are prescribed non-operative treatment ultimately go on to surgery. We have recently been modeling data from patients with rotator cuff tears to determine which patients will need surgical repair. Patient attributes (e.g., age, presence of pain, evidence of arthritis, etc) were extracted from the medical records of approximately 150 patients and input to a support vector machine (SVM), which is a machine learning tool. Initial attempts using this small sample of patient data have yielded about 90% accuracy. We are currently acquiring more patient data to create sufficient training and testing data sets.

Finite Element Modeling of the Glenoid Labrum

The finite element model of the glenoid labrum, which **Chris Gatti** has been developing with the aid of **Dr. Mark Palmer** and many students over the last three years, has been published in the *Annals of Biomedical Engineering*. The model is shown below.



The results of the model agreed extremely well with experimental measurements made by by **Ramon Ruberte Thiele** and **Wajeehullah Muhammad** on cadavers in the Orthopaedic Research Laboratories.

Support Vector Regression Modeling of Total Knee Replacement Operating Time

A major effort at LOCOS this last summer was developing predictive models for total knee replacement operative time. The purpose of the project was to improve scheduling of total knee replacement patients by predicting how long each operation would take, based on data available at the time of scheduling. The project involved much data collection, which was performed by **Kraig Delana**, **Jessica Seideman**, **Drew Donnell**, and **Chris Gatti**. Kraig developed a support vector regression model for predicting the data.

Alumni Facebook Pages

Known facebook pages for LOCOS folks include **Cari Bryant Arnold**, **Brian Childress**, **Clark Dickerson**, **Nick Flieg**, **Craig Hadgis**, **Richard Hughes**, **Amy Mell**, and **Erin McIntyre**.

Alumni News

“Alumni” includes faculty, staff, students, and community volunteers who have worked with Dr. Hughes at the University of Michigan.



Nikki Ritchie Orton and Dave Orton were married in 2009 in Ann Arbor (you may note that the photo was taken on the Island Park bridge).



Linda Gallo married Chris Elkins on June 6th, 2009.

Cameron Patthanacharoenphon graduated from medical school and matched to an orthopaedic surgery residency in Grand Rapids, Michigan.

Cali Harbaugh started medical school at the University of Michigan in 2010.

Nihar Kanodia has changed jobs and is now working for Innovative Sports Technology. He joins another LOCOS alum, **Mona Bhuta**, at IST.

Chris Gatti left LOCOS to pursue a doctorate in Decision Sciences at Rensselaer Polytechnic Institute.