UNIVERSITY OF
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AEROSPACE AND MECHANICAL ENGINEERING

"SEMINAR ANNOUNCEMENT"

SPEAKER: Professor Robert A. Siston
Department of Mechanical Engineering
The Ohio State University
Columbus, Ohio

TOPIC: COMPUTER-ASSISTED TOTAL KNEE ARTHROPLASTY

DATE: Tuesday, September 8, 2009

TIME: 3:30 p.m.

PLACE: 138 DeBartolo Hall

Abstract

Total knee arthroplasty (TKA) is performed to relieve pain and improve function in individuals with degenerative joint disease. While TKA is generally successful at restoring function and improving quality of life, a wide gap still separates those who cannot perform basic activities of daily living such as comfortably climbing the stairs within their homes to those who can go back to activities they love such as hiking, golfing, or playing tennis. Proper surgical technique affects the long term success of this procedure, as improper alignment can lead to loss of motion, accelerated wear, and even dislocation of the implants. This talk will focus on how computer-assisted measurement tools and forward dynamic simulations offer the potential to directly relate surgical technique to post-operative outcomes. After a brief description of the design and development of a custom intra-operative tool known as a surgical navigation system, the talk will describe the use of the navigation system in two studies. The first study investigated whether a navigation system could reduce the variability of techniques that establish femoral rotational alignment, a challenging and important step during total knee arthroplasty. During the second study, the system was used to perform the first intra-operative characterizations of the kinematics of advanced osteoarthritic knees and the first recordings of the change in passive kinematics as a result of posterior cruciate substituting total knee arthroplasty. The talk will conclude with a discussion of an investigation into how femoral rotational alignment affects knee kinematics and muscle mechanics in a simulated squatting motion. This work represents the initial steps of using these novel computer-assisted tools to improve the outcomes of total knee arthroplasty.