

# SEMINAR NOTICE

Preston M. Green Department of Electrical and Systems Engineering

## MINIMUM JERK TRAJECTORY PLANNING FOR TRAJECTORY CONSTRAINED REDUNDANT ROBOTS

DISSERTATION DEFENSE

by

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**Abstract:** In this dissertation, we develop an efficient method of generating minimal jerk trajectories for redundant robots in trajectory following problems. We show that high jerk is a local phenomenon, and therefore focus on optimizing regions of high jerk that occur when using traditional trajectory generation methods. The optimal trajectory is shown to be located on the foliation of self-motion manifolds, and this property is exploited to express the problem as a minimal dimension Bolza optimal control problem. A numerical algorithm based on ideas from pseudo-spectral optimization methods is proposed and applied to two example planar robot structures with two redundant degrees of freedom. When compared with existing trajectory generation methods, the proposed algorithm reduces the integral jerk of the examples by 75% and 13%. Peak jerk is reduced by 98% and 33%. Finally a real time controller is proposed to accurately track the planned trajectory given real-time measurements of the tool-tip's following error.

DATE: Monday, April 23, 2012

TIME: 1:00 p.m.

PLACE: Green Hall, Room 0120

Dissertation advisor:  
Dr. Heinz Schaettler

This seminar is in partial fulfillment  
of the Doctor of Science Degree