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Optimal Path Finding for Direction, Location and Time Dependent Costs, with Application to Vessel Routing

Thursday – March 4, 2010
4:00 - 5:00 pm
Refreshments available at 3:30 pm

Location:
Transportation Center –Lower level
Northwestern University
Chambers Hall - 600 Foster
Evanston, IL

Abstract: Real-time determination of an optimal path in a changing medium (such as winds and ocean waves) requires explicit incorporation of this cost function location- and time- dependency into the model. Furthermore, the direction-dependency of a cost function adds another layer of difficulty to the problem at hand. In this talk, we present methods to efficiently incorporate the complex structure of the cost function into the path planning process. We also integrate the system’s operability and dynamics constrains in the optimization model, hence combining traditionally separated optimal-path finding and path-following stages of problem solving. An application to ship routing is introduced throughout the talk to motivate this research.

Bio: Irina Dolinskaya is an assistant professor of Industrial Engineering and Management Sciences at Northwestern University. She obtained M.S. and Ph.D. degrees in Industrial and Operations Engineering from the University of Michigan, and B.S. degree in Industrial Engineering from the University of Florida.

Her research interests include operations research with emphasis on large scale and computationally demanding dynamic programming problems; optimal path finding in time-dependent networks; optimal path finding in a time and space evolving direction-dependent medium; and optimal routing of nonholonomic systems. Applications include vessel, autonomous vehicles and robot routing. She is also interested in the intersection of transportation and logistics with energy conservation.

Dr. Dolinskaya is the 2008 recipient of the Bonder Scholarship for Applied Operations Research in Military Applications. She is actively involved in various leadership and mentorship roles. Her academic achievements and contribution to the university community has been recognized by awarding her the University of Michigan College of Engineering Distinguished Leadership Award in 2008 and Distinguished Achievement Award in 2009.