**Department of Mathematical Sciences**
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**SEMINAR**

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304 Whitehead Hall
Refreshments: 3:30 p.m.
Seminar: 4:00 p.m.

# RANDOM DISAMBIGUATION PATHS

## Abstract

We wish to navigate from source $s$ to destination $d$ through a spatial configuration of detections $x_i$ and associated potential risk regions $B_i$, $i = 1, \cdots, n$. Associated with each detection $x_i$ is a mark $\rho_i$ indicating the probability that entering $B_i$ incurs non-zero risk. In accordance with application we may, upon approaching $x_i$, disambiguate the risk associated with $B_i$ (that is, determine conclusively if the risk $R_i$ associated with $x_i$ is indeed nonzero) at cost $c$ to the overall traversal time.

A *random disambiguation path* $p$ is a path-valued random variable whose various values represent different paths taken depending on the results of disambiguations; the actual path depends on the (unobserved at the outset) actual risks $R_i$. Our goal is to determine the random disambiguation path achieving the minimum expected zero-risk traversal time.

An illustrative application for random disambiguation paths is mine countermeasures path planning—navigating through a field of detections, each of which may or may not be an actual mine, but each of which is marked by the detector with a probability that the detection is indeed a mine. A sensor is available which allows us, when close enough, to determine conclusively whether or not the detection is truly a mine.

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