Toward Robust Autonomy in Complex Environments

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Abstract

Autonomous navigation in harsh environments will benefit from intelligent decision-making that considers a robot's performance in the presence of uncertainty. I will discuss two path planning algorithms that make projections about localization uncertainty to produce safe and informative routes for autonomous vehicles under sensors with varying performance and reliability. The first, the robust belief roadmap (RBRM), plans approximate minimum-uncertainty paths using a unique metric that bounds the growth of uncertainty under the probabilistic arrival of measurements. The second, the min-max optimal rapidly-exploring random tree (MM-RRT*), optimally curbs localization uncertainty using a sparse, tree-based representation of candidate paths and a min-max cost metric. I will also discuss ongoing work that seeks to leverage these methods on outdoor robot platforms through intelligent mapping, exploration, and inference that will support the planning process.

Bio

Dr. Brendan Englot received S.B., S.M. and Ph.D. degrees in Mechanical Engineering from MIT in 2007, 2009 and 2012, respectively. At MIT, he studied path planning for surveillance and inspection applications, deploying his algorithms on an underwater inspection robot that is now being produced in quantity for the US Navy. His research interests include planning, optimization and control in support of robust autonomous navigation. Dr. Brendan Englot received S.B., S.M. and Ph.D. degrees in Mechanical Engineering from MIT in 2007, 2009 and 2012, respectively. At MIT, he studied path planning for surveillance and inspection applications, deploying his algorithms on an underwater inspection robot that is now being produced in quantity for the US Navy. His research interests include planning, optimization and control in support of robust autonomous navigation. - See more at: http://www.stevens.edu/news/content/me-department-adding-tenure-track-faculty-robotics-bionic-systems-and-energy-fall-2014#sthash.BdwtBg5V.dpuf

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