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Speaker: Professor Oren Salzman

Department: Computer Science Department, Technion - Israel Institute of Technology

Title: Toward Asymptotically-Optimal Inspection Planning via Efficient Near-Optimal Graph Search

Abstract:
Inspection planning, the task of planning motions that allow a robot to inspect a set of points of interest, has applications in domains such as industrial, field, and medical robotics. Inspection planning can be computationally challenging, as the search space over motion plans that inspect the points of interest grows exponentially with the number of inspected points. In this talk I will present a novel method, Incremental Random Inspection-roadmap Search (IRIS), that computes inspection plans whose length and set of inspected points asymptotically converge to those of an optimal inspection plan. IRIS incrementally densifies a motion planning roadmap using sampling-based algorithms, and performs efficient near-optimal graph search over the resulting roadmap as it is generated. I will describe the algorithm and demonstrate IRIS's efficacy on a simulated planar 5DOF manipulator inspection task and on a medical endoscopic inspection task for a continuum parallel surgical robot in anatomy segmented from patient CT data. In these settings IRIS computes higher-quality inspection paths orders of magnitudes faster than a prior state-of-the-art method.

Bio:
Oren Salzman is an assistant professor at the Computer Science department at the Technion - Israel Institute of Technology. His research focuses on revisiting classical computer science algorithms, tools and paradigms to address the computational challenges that arise when planning motions for robots. Combining techniques from diverse domains such as computational geometry, graph theory and machine learning, he strives to provide efficient algorithms with rigorous analysis for robot systems with many degrees of freedom moving in tight quarters. Oren completed a PhD in the School of Computer Science at Tel Aviv University under the supervision of Prof. Dan Halperin. He then continued his studies as a postdoctoral researcher at Carnegie Mellon University working with Siddhartha Srinivasa and Maxim Likhachev and as a research scientist at the National Robotics Engineering Center (NREC). Oren has published over forty peer-reviewed conference and journal papers. He has received the best paper and best student paper in ICAPS 18 and ICAPS 19, respectively.