Validation of A Real-Time 3D Path Planning Algorithm With A Robotic Test-Bed

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Introduction

A novel algorithm, Hierarchical D* Lite (HD*), combines the incremental D* Lite with a hierarchical path planning approach to re-plan paths sufficiently fast for real-time operation. HD* does not need to update the map representation before planning a new path. To ensure feasibility, path smoothing and Catmull-Rom splines are used. Computation time and path quality are dependent on parameters such as map size, environment complexity, sensors range, and any restriction on planning time. Monte Carlo simulations were used to assess the performance and it was found that HD* finds paths within 10% of optimal in under 35 ms for the most complex environments tested.

Objectives

The objective is to verify the capability of a 3D hierarchical path planning algorithm HD*, to produce cost efficient paths in a timely manner in realistic scenarios for unmanned vehicles by demonstrating path planning capabilities for unmanned rovers and extending to UAVs.

References


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