

Proposer:
Kristopher W. Reese
Department of Computer Science
Hood College
Frederick, MD 21701
kwr2@hood.edu

Faculty Advisor:
George Dimitoglou
Department of Computer Science
Hood College
Frederick, MD 21701
dimitiglou@hood.edu

Statement of Topic:

A Survey of Path Planning Algorithms for Autonomous Robotics

Significance and Relevance to Computer Science:

Path planning is a significant and fundamental area of research in autonomous robotics. It is a very active¹ research area in computer science, using, extending and adopting algorithms and techniques from artificial intelligence, machine learning and computational geometry. In addition, path planning lends itself for interdisciplinary approaches, mostly bringing together computer science with principles and elements from physics and mathematics.

The results from this research area are a wide range of, often complex, algorithms that solve certain aspects of path planning problems. It is very difficult for anyone studying, experimenting, teaching or implementing path planning algorithms to know which algorithm is best to use. Our work provides a survey and overview of the most common algorithms, illustrating their types, advantages, disadvantages and applicability. We expect that this poster will become a valuable resource to students and faculty in learning, teaching and selecting the appropriate algorithms to solve path-planning problems.

Abstract:

There are numerous path-planning algorithms for autonomous robotics. This survey attempts to cover a number of the most commonly used heuristic and non-heuristic techniques in an effort to categorize and classify them. The algorithms range from very old ones, such as path planning based on Voronoi diagrams, to more modern algorithms such as A* and ARA*. The objective is not to determine the best algorithmic technique but to provide a matrix-like comparison that illustrates the types, advantages, disadvantages and applicability of these techniques in solving path-planning problems.

¹ Over 5,500 citations in the ACM Digital Library for the search term “path planning” with entries from as late as 1961.