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REVIEW ON CURRENT PATH PLANNING ALGORTHMS FOR AUTONOMOUS ROBOTIC APPLICATIONS

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ABSTRACT

Robotic systems grow more and more popular each year, with a wide variety of applications in almost all aspects of our life, these applications range from mobile robots, industrial robots, surgical robots, and even space robotics. Now it might seem that the wide use of robots in modern life implies that the motion-planning problem has already been solved, However This is far from true. With increasingly more ideas being implemented by robotics systems in different applications, the desire for Autonomous path planning methods is at an all-time high. This paper will review the most up-to-date autonomous path planning techniques. Furthermore, we will list the advantages and disadvantages of these methods and conclude this review with some of the currently open research problems in the field. In general, the goal of path planning algorithms is to achieve the optimal path; the path that requires the least amount of energy (the closest path), reduce the travel speed, processing time (computation), and more importantly can avoid Obstacles and collision (whether they are Static or dynamic obstacles). This paper will contain the following methods that are currently being researched in different robotic systems; Coverage Path Planning, the Random Walk, Sampling-Based Motions Planning (this includes the Rapidly Exploration Random Tree, and the Probabilistic Road Map), the Artificial Potential Field method, Greedy Algorithms (such as: Dijkstra's, A*, etc.), Genetic Algorithms, Swarm intelligence (such as: Ant Colony Optimization, Particle Swarm Optimization, etc.), and finally the Machine Learning Algorithms, and Reinforcement Learning; two of the most hot research topics currently being explored in robotic systems.