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# Simultaneous Task Allocation and Motion Coordination Algorithm for Multiple Autonomous Vehicles in Dynamic Environment

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## Abstract

Task allocation, path planning and collision avoidance of autonomous vehicles is a complex problem. However, currently there are number of practical applications which are available in automated material handling systems in manufacturing and transshipment terminals where fleet of automated guided vehicles or automated straddle carriers operate. Presently this complex problem is solved in a sequential manner so that overall solution quality cannot be guaranteed. In order to avoid this, this problem is solved in simultaneously in static task allocation environment where vehicle, tasks and path related information known beforehand. However, it is difficult to find any researches attempted to solve these three sub problems in simultaneous manner due to inherent complexity. Therefore, this research focuses on solving these complex problems in dynamic environment where tasks, vehicle and path complete information are not known beforehand. Meta heuristic / evolutionary techniques and dispatching rules are used to generate near optimal solutions along with simultaneous Path and Motion coordination algorithm, which was based on Dijkstra algorithm and dynamically weight updating mechanism for path network. The simulation studies reveals that proposed approach can be used to solve complex problem in simultaneous manner and the proposed approach can quickly alter the previously decided schedules in the case of sudden vehicle breakdowns etc.

## Keywords
Simultaneous task allocation and motion coordination, Meta heuristic, autonomous vehicles