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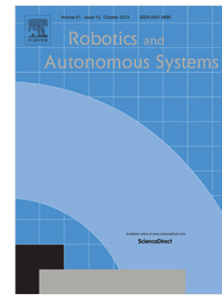
Resource-based task allocation for multi-robot systems

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# Resource-based Task Allocation for Multi-Robot Systems

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## Abstract

This paper proposes a resource-based task allocation algorithm for multi-robot systems. During mission operations, robots continuously consume their resources which must be refilled during their operations. Unlike other existing auction-based algorithms in which robots do not account for their resources in task allocations, the proposed algorithm considers the resources of the robots to generate their costs. In this algorithm, robots calculate the task performance estimation considering all the possibilities of visiting different combinations of refill stations based on their resource levels. This enables the robots to reduce unnecessary wastage of time and resources during the mission. The effectiveness of the proposed algorithm with respect to task completion time, resource consumption, and communication overhead is theoretically analyzed and is also demonstrated from the simulation of the delivery mission.

*Keywords:* Multi-robot systems, decentralized coordination, resource-based task allocation

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## 1. Introduction

Multi-robot systems have been used in various missions that require fast, efficient, and robust performance, such as surveillance, reconnaissance, and continuous area sweeping [1]-[4]. The multi-robot task allocation problem is one of the core issues in multi-robot systems. In particular, auction-based approaches in multi-robot task

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