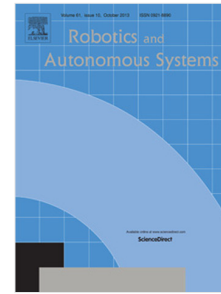


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A Directional Antenna based Leader-Follower Relay System for End-to-End Robot Communications

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Abstract

In this paper, we present a directional antenna-based leader-follower robotic relay system capable of building end-to-end communication in complicated and dynamically changing environments. The proposed system consists of multiple networked robots - one is a mobile end node and the others are leaders or followers acting as radio relays. Every follower uses directional antennas to relay a communication radio and to estimate the location of the leader robot as a sensory device. For bearing estimation, we employ a weight centroid algorithm (WCA) and present a theoretical analysis of the use of WCA for this work. Using a robotic convoy method, we develop online, distributed control strategies that satisfy the scalability requirements of robotic network systems and enable cooperating robots to work independently. The performance of the proposed system is evaluated by conducting extensive real-world experiments that successfully build actual communication between two end nodes.

Keywords: Multi-Robot System, Relay Robots, Robotic Convoy System, Wireless Communications, Directional Antennas, Weighted Centroid

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