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Corrigendum: Path planning for unmanned surface vehicles in anchorage areas based on the risk-aware path optimization algorithm

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KEYWORDS

unmanned surface vehicles, anchorage areas, risk-aware path optimization, ship domain, Gaussian influence function, dual-phase smoothing strategy

A Corrigendum on

Path planning for unmanned surface vehicles in anchorage areas based on the risk-aware path optimization algorithm

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In the published article, the **Abstract** contains certain abbreviations and terms that may affect the clarity and academic quality of the paper.

A correction has been made to the **Abstract** section. This sentence previously stated:

"In dense anchorage areas, the challenge of navigation for Unmanned Surface Vehicles (USVs) is particularly pronounced, especially regarding path safety and economy. A Risk-Aware Path Optimization Algorithm (RAPO) is proposed to enhance the safety and efficiency of USV navigating in anchorage areas. The algorithm incorporates risk assessment based on the A* algorithm to generate an optimized path and employs a Dual-Phase Smoothing Strategy to ensure path smoothness. First, the anchorage area is spatially separated using a Voronoi polygon, the RAPO algorithm includes a grid risk function, derived from the ship domain and Gaussian influence function, in the path evaluation criteria, directing USV to successfully bypass high-risk areas and as a result. Then the DPSS is used to decrease path turning points and boost path continuity, which in turn improves path economy. Simulation results demonstrate that this method significantly reduces the path length and the number of turning points, enhancing USV navigation safety in anchorage areas."

The corrected sentence appears below:

"In dense anchorage areas, the challenge of navigation for Unmanned Surface Vehicles is particularly pronounced, especially regarding path safety and economy. A Risk-Aware Path Optimization Algorithm is proposed to enhance the safety and efficiency of Unmanned Surface Vehicle navigating in anchorage areas. The algorithm incorporates risk assessment based on the A* algorithm to generate an optimized path and employs a Dual-Phase Smoothing Strategy to ensure path smoothness. First, the anchorage area is spatially separated using a Voronoi polygon, the Risk-Aware Path Optimization Algorithm includes a grid risk function, derived from the ship domain and Gaussian influence function, in the path evaluation criteria, directing Unmanned Surface Vehicle to successfully bypass high-risk areas and as a result. Then the Dual-Phase Smoothing Strategy is used to decrease path turning points and boost path continuity, which in turn improves path economy. Simulation results demonstrate that this method significantly reduces the path length and the number of turning points, enhancing Unmanned Surface Vehicle navigation safety and economy in anchorage areas."

The authors apologize for this error and state that this does not change the scientific conclusions of the article in any way. The original article has been updated.

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