OBSTACLE AVOIDANCE FOR UNMANNED SURFACE VEHICLES: SIMULATIONS AND EXPERIMENTS

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Abstract

Sri Lanka ports authority and many other organizations are increasingly interested in the use of Unmanned Surface Vehicles (USV) for harbor security and surveillance applications. USVs can be used to collect information, samples and perform experiments inside a harbor or outside by. Navigating through ships and other objects.

This research study is focused on finding algorithms for obstacle avoidance (OA) of USVs. The initial paradigm that is used to establish the solution was the OA of Unmanned Ground Vehicles (UGV). The algorithms developed for UGV were implemented practically with the limitations of hardware. Then, effort is taken to apply those algorithms to the surface vehicles with some modifications.

In this study, a novel OA algorithm is proposed for static obstacles based on the Morphin algorithm. This proposed algorithm and the previous algorithm which is developed based on ground vehicles are compared with the potential field method.

Static OA without dynamic OA is not helpful for unmanned vehicles on sea. A lot of researches have been carried out to avoid dynamic objects, but have failed to find an optimum solution although comparatively good approaches have been presented. Intelligent techniques have been rarely applied for dynamic obstacle avoidance. In this research, the effectiveness of applying intelligent or mathematical techniques for path prediction of dynamic obstacles is discussed with simulations to pick the best for a given situation. Then a noval projected dynamic obstacle area method is presented to avoid dynamic obstacles effectively. Comparative results are presented at the end to prove the strength "of the noval dynamic obstacle area method.