

An autonomous hovercraft with minimum energy consumption

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Abstract

The objective of this work is to introduce an autonomous Hovercraft with minimum Energy consumption. To achieve this goal, a computer simulation in addition to practical testing of a simple hovercraft model have been carried out. A mathematical model for the hovercraft is considered and simulated in the MATLAB/SIMULINK environment. A navigation system with Global Positioning System (GPS) integrated with an Inertial Measurement Unit (IMU) sensors are used to monitor the speed, position, and the direction of the hovercraft for the autonomous operation. Two motors with propellers are used for the lifting and thrust systems, while a third one is used for the rudder movement that controls the direction. Specific resistance (ϵ) index is used to test the hovercraft performance. The results of the practical experiments of moving the hovercraft between two and three points are compared with that of the computer simulation. The distance error from the actual target has been found to be in the range of about 18%, which proves the idea. It should be noted that this significant error is due to the fact that the GPS considered is a low price commercial one and using more accurate one will result in more satisfactory results. Based on the computer simulation and practical testing results, a look up table has been prepared to help in deriving an algorithm for controlling the RPM of lifting and thrust Fans based on the minimum optimum specific resistance.

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