

A Review on Developing High-Capacity Battery Systems for Warships in the Era of Artificial Intelligence

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Battery technologies have ever been developing rapidly in the era of Artificial Intelligence for the marine transportation industry aiming for more greener energy for propulsion. Meanwhile, the warships are also transforming from traditional propulsion to modern hybrid or pure electric propulsion. The potential for battery-electric propulsion and batteries in combination with a diesel-powered and steam-powered main engine in a hybrid system is considered currently. Therefore, battery technologies are developing rapidly to cater to this future potential maritime propulsion applications/requirements. The propulsion and auxiliary systems onboard ships are designed to run the ship smoothly. Therefore, it is required to cater to the energy demand of ships by either traditional energy sources such as fossil fuel or by hybrid energy sources such as diesel /electrical, pure electrical energy sources, or renewable energy sources. The weight, volume, and cost of a maritime battery system are major factors when designing a battery system to run ships. The energy consumption for various operations and routes of a large military vessel is considered in identifying energy demands through pure battery, battery-electric, or hybrid propulsion, along with the potential for catering to the ship's electric load while the vessel is in harbour. The amount of load required to move in different environmental conditions is also considered while selecting the best energy storage systems onboard. This paper gives an overview of the state-of-the-art battery technologies available and important future developments that may potentially exploit the usage of batteries in future ship's power and propulsion requirements in the era of Artificial intelligence.

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