TOP TEN

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Unmanned surface vehicle for offshore wind farms diagnostics

Offshore wind energy is a zero-emission renewable energy technology. Both wind farms and wind turbines are becoming larger in size. The average lifespan of such a turbine is 25 years. However, to ensure it can operate for that long, it requires proper diagnostics (at least twice a year) and adequate maintenance. The turbine's condition is mainly affected by damages resulting from wear and tear and weather conditions. To provide a cheaper, faster, and safer way that does not endanger human lives, drones have been increasingly used for the inspection of wind farms. However, such inspections are not always possible, as they require suitable weather conditions. Wind turbines themselves also do not operate all year round. The turbine blades are shut down when the wind speed is below 3 m/s or above 25 m/s with the most optimal wind speed being 12 m/s (Beaufort 6).

To tackle the diagnostics of offshore wind farms, this research introduces a watercraft allowing for autonomous navigation, which with the help of flying drones performs diagnostics of both the rotor blades and the windmill tower itself. The concept will facilitate operations that are much more complicated in the seas and oceans. The designed electric platform will be both a landing pad for flying drones and a place where these drones recharge their batteries. Diagnostics at sea are much more complicated than on land, which led to the idea of designing a Diagnostic - Unmanned Surface Vehicle (D-USV), an unmanned watercraft that would facilitate this task.