Aerial Quadcopter Units for Aquatic Flow Investigation and Nautical Data

Publieke samenvatting / Public summary

Aanleiding

One of the main challenges faced by the offshore energy industry is the operational efficiency of vessels, equipment and human resources. Therefore, improving the operational efficiency will not only reduce costs, but will also significantly improve the sustainability factor of these practices in this industry. Physical activity in this industry is taking place further offshore. As many nearby coastal areas are already utilised and equipped with offshore wind farms, operations for installation of wind farms and Operations and Maintenance (O&M) for offshore wind farms have to be done deeper into the sea. This comes with its particular challenges, such as the harsher conditions that will be faced in the environment of The North Sea. This sea is characterized by its rough waves, strong winds, rapidly changing weather conditions and more, creating difficult circumstances for vessels to operate in.

Doelstelling

The proposed project builds upon recent advancements in drone technology, sensor capabilities, and machine learning algorithms to develop an autonomous aerial drone swarming system for real-time wave profile prediction. By deploying swarms of aerial drones equipped with specialized sensors, this system aims to collect comprehensive environmental data around operating offshore vessels and provide the control station with real-time data for accurate predictions of wave profiles and vessel motion in real-time,

Projectinformatie / Project information

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Algemene informatie / General information

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Spectx B.V.

Publicaties en materialen / Publications and attachments

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allowing sufficient warning- and short-term decision-making time. This information will enable precise weather predictions and early warnings, improving operational efficiency and risk management.

Korte omschrijving

The activities of this project will include the development of dynamic aerial drone swarming systems, enabling efficient coordination and control of the drone swarm during offshore operations. For the drones themselves, a new flight controller will be developed to withstand the dynamic weather conditions at sea. The design and development of new (flight) hardware components is also necessary, especially the testing and integration of to-be-used sensors. All these hardware and software parts will be fused into one reliable system capable of swarming the flights. Furthermore, a robust data transmission and communication system will be established to reliably support all the data the swarm will be sending. This involves the selection, integration, implementation and testing of communication mediums to ensure robust connectivity in harsh offshore environments. The collected data will be used to develop models to predict the waves and vessel motion. The algorithms, models, drones, sensors and other systems will be continuously tested to ensure functionality.

Resultaat

The result of this MOOI project will be a validated AQUAFIND prototype and pilot results. After successfully completing this project, AQUAFIND will be ready for demonstration, production and commercialisation, given that AQUAFIND will be adjusted based on the results from this R&D project. Since the project will be finished in 2028, the first demonstration will be realised in 2029. With success, AQUAFIND can be commercialised and upscaled rapidly, and end-users can adopt the results of this project swiftly. The implementation of the proposed system contributes to the acceleration of the installation of offshore wind turbines, through optimisations of routes and installation times and by minimizing downtime. It furthermore provides a

safer environment for personnel through timely warnings of changing (weather) circumstances. Lastly, utilising the drone swarm in this way will reduce the carbon footprint of such operations by reducing unnecessary sheltering of vessels and suboptimal starting of installation activities. It will create these benefits in the same manner for the installation of new turbines as for maintenance operations.

De data in deze applicatie is afkomstig van de Rijksdienst voor Ondernemend Nederland (RVO) en wordt in samenwerking met de Topsector Energie ontsloten.
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