

Real-Time AI Species Recognition for Marine Biodiversity Monitoring: A Transformative Approach for Offshore Wind Management

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The rapid global expansion of offshore wind is critical for meeting net-zero targets but presents distinct ecological management challenges. Effective biodiversity monitoring around marine renewable installations traditionally involves intermittent, costly methods with significant data gaps, limiting robust ecological assessments and adaptive management responses. Recent advancements in real-time Artificial Intelligence (AI) species recognition technology represent a transformational shift, providing continuous, high-resolution biodiversity data.

This research highlights practical applications and validations of AI-driven underwater monitoring systems within offshore wind farms. Notably, initiatives such as The Rich North Sea Program (Netherlands) and RWE's SeaMe project have successfully implemented AI monitoring technologies, significantly enhancing our understanding of ecological interactions and biodiversity outcomes associated with marine structures. Canadian initiatives, including those by **Ocean Networks Canada and FORCE**, further validate the role of AI monitoring in ecological understanding and adaptive management of marine renewable projects.

Real-time AI monitoring fosters unprecedented stakeholder engagement through live-streaming biodiversity data, creating transparency and enhancing public support and education, particularly within local communities and educational institutions. This approach is critical for generating social licence and community collaboration in marine renewable developments.

By harnessing the power of real-time AI monitoring, marine renewable projects substantially improve ecological outcomes, effectively meet regulatory demands, and authentically engage communities. This presentation discusses the scalability of AI-driven monitoring solutions, integration into adaptive management frameworks, and their role in shaping policy and operational decisions within the offshore wind sector.