

**75238\_ Drone Swarm for Unmanned Inspection of Wind Turbines (Dr-SUIT):**  
*Battery Health Management, Hybrid Comms Systems and Operational Platform  
for Autonomous Offshore Wind Farm Inspection*

**Public description (ABSTRACT):**

Airborne Robotics (AR), Ocean Infinity (Ocean) and Bentley Telecom (Bentley) are working in partnership with the University of Portsmouth (UoP) to develop drone swarming capabilities and an operational platform for an autonomous inspection in offshore windfarms (OWF). Utilising a system-of-systems approach, the project entitled “Dr-Suit”, focuses to build in drone swarm resilience and safety especially when facing the challenges including access and environment hazards, increased Operations and Maintenance (O&M) costs, and drones’ battery life limitation.

Although drones have been used for WT inspection, a drone swarm deployment offers benefits of larger/further coverage and reduced inspection time. Since drones are currently not designed for swarm operation at a standard use, Dr-SUIT will develop an algorithm to interplay, therefore progressively shift the design from a single pilot controlling a drone to a single pilot controlling multiple drones, optimised by the hybrid communication system (4G, 5G, satellite) integration. The 5G network will reduce the latency and increased bandwidth size and speed. The utilisation of satellite communications extends the coverage to the communication industries and cost-effective backhaul services. The hybrid system will address issues of latency, redundancy, and bandwidth size for detection’s continuous/big data relay, thus enhancing drone-to-drone, drone-to-operator and sensing performance during swarming operation.

Battery life is another issue when calculating power and flight time required for an entire operation (accounting flying to above ~200m turbines and inspecting ~70-90m long blades).

A novel swarm-aware battery health management system with predictive analytics will be developed along with a battery recharging/swapping system which is needed for more realistic drone swarming missions. A barge with a small power unit will be utilised as a platform for drones to recharge/swap batteries, for a timely operation, and for a 5G mast and satellite. Essential to the swarm safe operation, a real time inspection scheduling and routing will be mathematically modelled factoring drone’s performances, turbine positions, and environment. A live demonstration of an optimised drone swarm deployment performing blades inspection will conclude this Phase 2 project.