Centre for Robotics & Intelligent Systems

- Work-class commercial and Advanced Experimental Smart ROVs
- OceanRings: Advanced Control Software
- 3D Image Reconstruction


OFFSHORE WIND


WAVE ENERGY


TIDAL ENERGY

About Us

Our research covers the development of advanced inspection and operation systems, operations of offshore airborne wind energy technologies, optimisation of offshore wind turbine array operations, ocean observation, and marine infrastructure monitoring and control. Operation support in the Marine Renewable Energy usually occurs on floating infrastructures, so conditions are regularly beyond the capability and operating limits of commercial ROV technology. This means new smart ROV systems capability is necessary, and that is what our team at CRIS UL has been developing. Our focus is on the development of Remotely Operated Vehicles (ROVs) with smart cameras and sonars, a high degree of autonomy, and the ability to operate in challenging conditions, such as strong wave and current. With our systems, we aim to reduce the cost of inspection and intervention of MRE projects substantially.

Our Expertise & Research

- Remotely operated vehicles and smart systems - fault tolerant control, auto tuning, one-click auto survey, augmented reality visualisations & teleoperation
- Vehicle operations in high energy sites
- Sensored telemetry streaming and ocean sensing platforms & technologies
- Smart automated manipulator control and real-time 3D localisation and imaging / mapping for 3D reconstruction and intervention
- Inspection of subsea infrastructure (pylons, jackets, cables, moorings) for offshore wind
- Emergency response exercise planning & coordination

www.cris.ie

CRIS
Centre for Robotics & Intelligent Systems

Our Systems

Field Robots

MRE ROV Étaín (Forum)

- Observation commercial class ROV configured for high thrust and lifting capabilities, with additional hydraulic power unit for underwater intervention using manipulators. It has a LARS/TMS system, as well as free-swimming operations. Equipped with a variety of sensors and tooling, including fibre gyro INS and DVL, sonars - forward looking, side scan and bathymetric, sound velocity probe, depth and altitude sensors, GNSS while on surface, high definition cameras, lights and manipulators.

MRE ROV Étaín field operation substation Offshore Wind Farm

I-ROV Éad (CRIS)

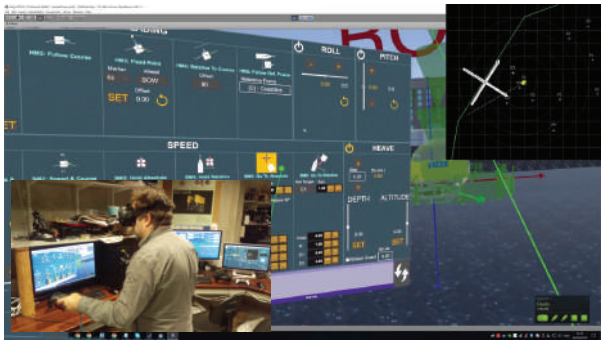
- Reconfigurable, observation-class, small size, easy deployable inspection ROV, designed for operations in challenging conditions. Suitable for underwater operations up to 300m depth. Equipped with the iXBlue ROVINS nano system, integrated with Nortek DVL and GNSS. The I-ROV is driven by OceanRINGS+ control software, with active fault-tolerant control module built-in

I-ROV field trials at Portroe Lake

Software applications

OceanRINGS+

- Suite of software tools for positioning and control of field robots/UAS with augmented reality displays. Centimetre accuracy control & navigation unlocking complex flight operations capability. Smart, intuitive and easy to use user interface, enabling average pilots to achieve exceptional results.



OceanRINGS+ user interaction interface

Please contact us for detailed technical specifications and with any queries you have.

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Field Operations

Ireland's European Structural and Investment Funds Programmes 2014-2020
Co-funded by the Irish Government and the European Union

European Union
European Structural and Investment Funds

Science Foundation Ireland sfi For what's next

UNIVERSITY OF LIMERICK OLLSCOIL LUIMNIGH

MaREI Energy · Climate · Marine

Centre for Robotics & Intelligent Systems

- UAV /drones inspection and surveillance
- Flight command & control systems and airborne systems design
- Terrain mapping and 3D image reconstruction
- Thermal imaging

ENERGY NETWORKS

OFFSHORE INSPECTIONS

INDUSTRY

About Us

In CRIS, we focus on a wide array of UAV/drones technologies and applications that range from inspection of electricity networks to the use of drones in manufacturing. Our drone group is a dynamic application-focused research team, interested in problems that can be solved using drones or unmanned vehicle technologies. We aim to develop blended autonomy systems, with a special interest in the development of the computation engines that enable the drone to operate both autonomously and with pilot in the loop for hazardous or close quarters critical work, addressing the key challenges such as navigation, 3D reconstruction of the environment, machine learning algorithms and managing low power restrictions. Our facilities include a well-equipped drone laboratory, including commercial fixed-wing and multi-rotor drones, along with a wide array of portable sensors and equipment (navigation IMUs and transponders, LIDAR, HD cameras, photogrammetry, thermal cameras and other sensors).

Our Expertise & Research

- Advanced aerial surveillance technology
- Photogrammetric 3D image reconstruction
- UAV systems for inspection of Wind Energy Systems Infrastructure and transmission lines
- UAV/drones for remote sensing operations including long-range/long endurance
- Development of LIDAR techniques in UAV operations
- Drone applications in smart factories
- Robot systems – flight control
- Enhanced piloting environment

CRIS Octocopter – Heavy Lift

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Our Systems

CGT50-SLT - Fix-wing (A-techSYN)

- A 4,71 m wingspan T-Tail UAV, autonomous system with vertical take-off/landing, 6 hours endurance, 5 kg payload, +18.000 ft. max. altitude, low fuel consumption. Uses state-of-art, fully customised AvionicsMini Flight Control System, which includes the power management, flight control and suitable connector interfaces for all necessary avionic components in a single unit.

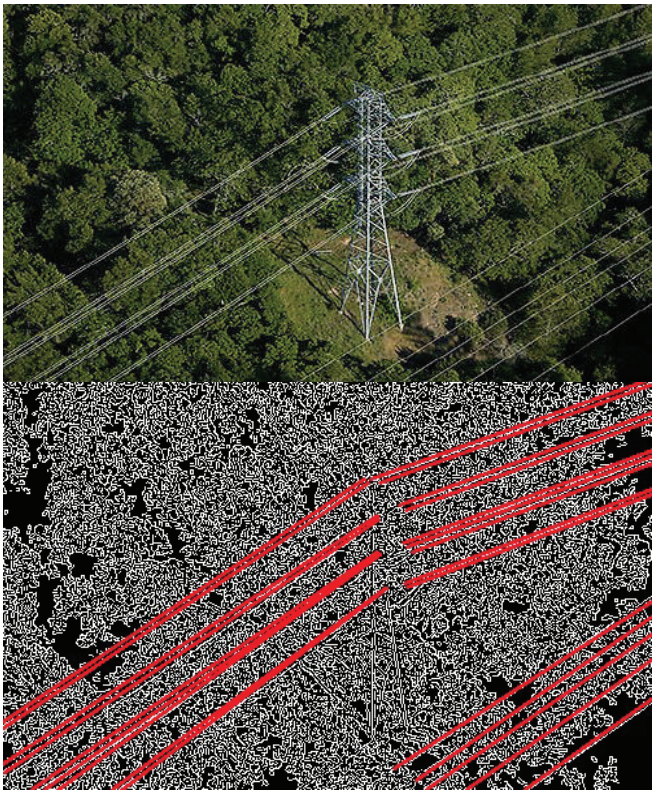
Matrice 600 - Simply Professional Performance (DJI)

- Extended flight time and a 5 km long-range, ultra-low latency HD image transmission for accurate image composition and capture, intelligent Batteries and Battery Management system, for maximum performance and quick setup. Implementation of DJI SDK, allowing for bespoke flights with advanced control and functionality.

CRIS Octocopter – Heavy Lift

- Built in-house on the PX4 Flight Stack, this eight rotor heavy lift octocopter supports up to 5kg payload options with significant flight time (40 minutes base). With an open-source hardware and software system, this platform allows even further customisation and advanced flight control options than the DJI platform. Payload systems, including mountings and power systems, can be designed and implemented quickly.

DEMO CGT50 fix-wing UAV. Use QRcode to access the DEMOvideo.



UAV close quarters inspection of distribution network transmission lines using infrared camera.

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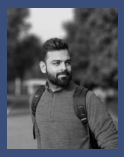

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European Union
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UNIVERSITY OF LIMERICK OLLSCOIL LUIMNIGH

MaREI Energy · Climate · Marine

Centre for Robotics & Intelligent Systems

Wind Energy Sector Research and Development

- Wind energy / offshore wind farms
- Airborne wind energy solutions
- Novel power transmission for offshore wind
- Inspection repair maintenance subsea and airborne (with ROVs and drones)

About Us

In CRIS research we focus on making offshore wind energy systems more robust and profitable, reducing the IRM Inspection Repair Maintenance requirements, need for personnel offshore and deep system design improvements that increase utility factor. We achieve this with robot technology capability for IRM in the challenging marine environment and with rugged system designs to reduce servicing costs and weather downtimes increasing power generation.
We are focusing on novel electrical power generation and transmission designs specifically wind to grid systems that have fewer failure points and facilitate wind generation further offshore and in deeper water. With recent sector developments (larger generators and floating turbines), offshore wind is pushing further off into deeper waters. Conventional HVAC marine transmission technology is inefficient above 50km with LFAC and HVDC offering alternatives.

Our Expertise & Research

- Offshore Wind & Airborne Wind Energy Electrical Systems Design
- Novel Power Transmission and Integration Solutions for Marine Renewable Energy Farms
- ROV and UAV Inspection of Subsea Infrastructure (pylons, jackets, cables, moorings, nacelle, turbine blades) for Offshore Wind
- Li-Ion battery, E-Vehicle battery - Second Use for Energy Storage within MRE Systems

www.cris.ie

CRIS
Centre for Robotics & Intelligent Systems

Our Infrastructure/Equipment

Hardware-in-Loop System

- 6kW Wind Energy Farm Emulator
- 20 kW Grid Emulator
- FPGA-Based Control and Data Acquisition System

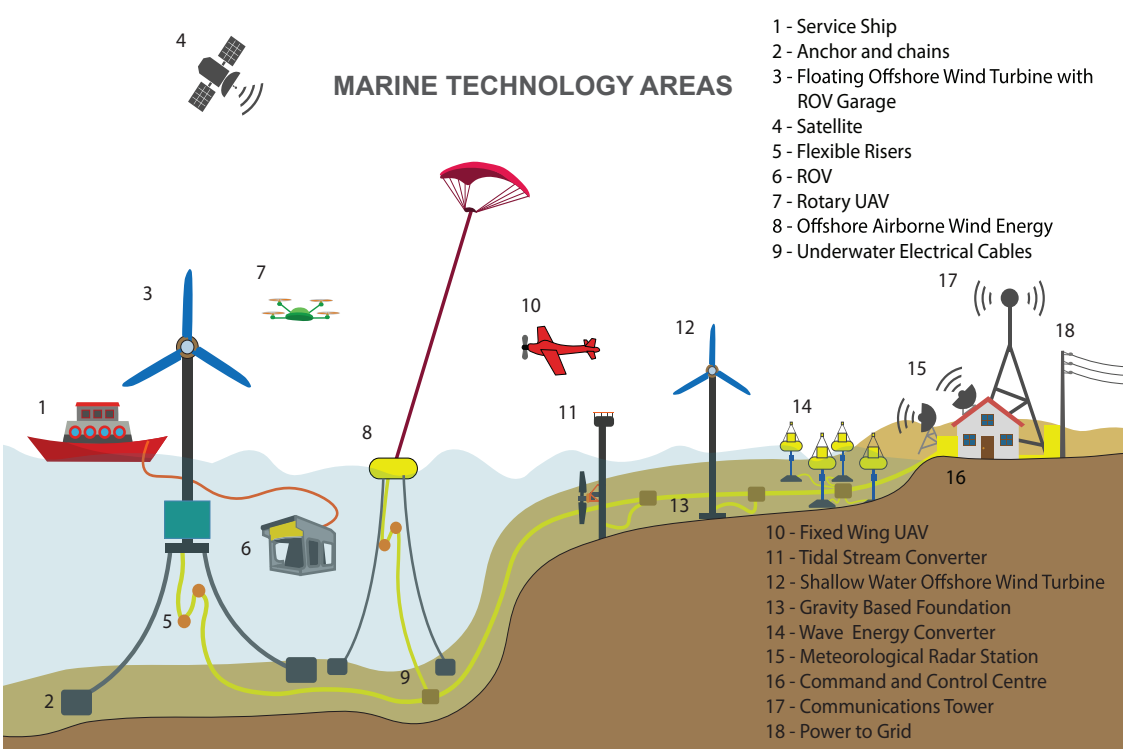
Computer Simulation Model

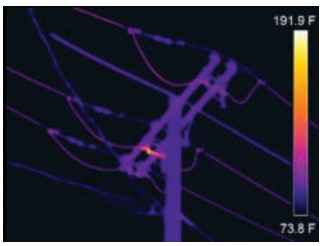
- Large Scale Wind Energy & Transmission Systems
- Wind Energy and Transmission Systems under Fault and Abnormal Conditions

Field Robots

(see our field robotics brochures for more detail)

- Multicopter Drones for Close Quarters Visual and Lidar Inspection of Wind infrastructure
- CGT Hybrid VTOL/Fixed Wing long endurance long range UAV
- Wind Energy and Transmission Systems under Fault and Abnormal Conditions





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