DURABLE Forums on Robotic & Aeronautic Tech. for solar & wind O&M

Webinar and B2B virtual meetings
2nd April 2020
Presentation

Silvia de los Santos
Head of Aerospace & Production Sector

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Recommendations

- We would love to hear from you during the presentation:
  
  *Write us your questions by: ‘Chat window’*

- You will find later this webinar the B2B session:
  
  *Book your latest meetings right now...*
  
  https://robotic-aeronautic-tech-foro.b2match.io/

- Our website
  
  https://www.durableproject.eu/

- Please, keep your microphones off

- The webinar is been recorded

- Feel free to share this webinar in your social networks!!

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**ADVANCED TECHNOLOGY TO BOOST THE USE OF RENEWABLE ENERGY.**

The European project DURABLE will apply drones and robots to accelerate the performance of wind and solar power in the Atlantic region.
Technologies to be presented

1. **ALERION**
   - Intelligent drones: Autonomous up-close relative navigation
     [Request a meeting](#)
   - Embedded edge computing: Real-time damage detection
     [Request a meeting](#)

2. **UNIVERSIDAD DE SEVILLA** [Request a meeting](#)
   - Intelligent navigation for autonomous aerial inspection
   - Custom aerial manipulator design and development

3. **FADA-CATEC**
   - Autonomous UAV inspection without contact - Visual
   - Autonomous UAV inspection without contact - IR Thermography
   - Autonomous UAV inspection with contact
     [Request a meeting](#)

4. **UWE BRISTOL**
   - Custom UAV design and manufacture
     [Request a meeting](#)

5. **INSTITUTO SUPERIOR TECNICO** [Request a meeting](#)
   - Autonomous UGV inspection without contact
   - Autonomous UGV inspection with contact
   - Guidance, navigation and control of an UGV
   - Ground mobile support
   - 3D Reconstruction

6. **LORTEK**
   - Metallic Additive Manufacturing technologies (SLM, LMD & WAAM)
     [Request a meeting](#)
   - Inspection by NDTs (Electroluminiscence & Thermography)
     [Request a meeting](#)

7. **DUBLIN CITY UNIVERSITY** [Request a meeting](#)
   - Radio Frequency: Near/Far Field Sensor
   - Smart Grid intelligent sensors

8. **ESTIA** [Request a meeting](#)
   - Mixed Reality (MR) Remote vehicle control
   - Mixed Reality (MR) Remote arm robot control
   - Mixed Reality (MR) Composite View
   - Mixed Reality (MR) Additional environment information visualisation
   - Abrasive water jet blind machining
Do not forget to request B2B meeting, please...

https://robotic-aeronautic-tech-foro.b2match.io/page-3781

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ALERION

WP4 webinars
• Alerion was born in 2014 in Munich (Germany)
  ➢ Incubated at European Space Agency's Business Incubation Centre
• Since 2016 we have been offering **custom automated industrial inspection solutions**
• Our dynamic team comprises engineers with research and industry experience in developing:
  ➢ High-performance computational software
  ➢ Machine learning based computer vision
  ➢ High performance drones for extreme environments
Main lines of work

**Intelligent drones**
- Autonomous and automated inspections
- Relative up-close navigation
- Complex multi-structure inspections

**Embedded edge computing**
- High-performance computing
- Real-time data analysis
- AI based detection

**Custom UAV design**
- Designed for extreme environments
- Longer flight-time
## Autonomous up-close relative navigation

### Description

Autonomous navigation that allows the drone to be placed at a constant distance from the structure with the blade aligned perpendicular to the drone's body frame. The drone also determines which blade it's inspecting, which side of the blade, and the distance to the root.

### Potential application

Implementation of inspection/maintenance robotic arm with autonomous control. Useful for maintenance operators and pilots.

### Benefits

Remote inspection and manipulation with high precision. Improved planning of O&M: automated and repeatable inspections. Minimizing personnel risks, costs (very high in this kind of works) and time.

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Application field</td>
<td>Wind</td>
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<tr>
<td>Current TRL</td>
<td>6</td>
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</table>
Real-time damage detection

**Description**
Real-time damage detection while the inspection is being made based on AI algorithms. After landing, a damage-report is created with all the damages and their context, like, exact position, damage type, etc.

**Potential application**
Remote arm robot control by natural interaction.

**Benefits**
Flexible inspection solutions with a digital register (for example, onsite reports, etc.) Minimizing personnel risks, costs (very high in this kind of works) and time: no need for cloud based infrastructure, no need of internet access.
If you are interested in requesting a B2B meeting, please do not hesitate to contact us to know more about the development of our technologies

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Website: www.aleriontec.com
Technical presentations

WP4 webinars
The Robotics, Vision and Control Group (GRVC) of the University of Seville is a large group consisting of more than 70 members, including 13 professors, researchers and engineers. GRVC plays a relevant international role in robotics, and particularly in aerial robotics and unmanned aerial systems.

GRVC combines scientific research with technology development, technology transfer to companies and applications in collaboration with these companies.

Moreover, in the last 5 years, GRVC has had more than 55 research projects and contracts obtaining an external funding of more than 12 million euros of funding from the European Commission, companies, the Spanish Research Programme and Regional Research Programme in the topics.
Main lines of work

Intelligent Navigation
- Navigation in GPS denied and confined spaces
- Collision detection and avoidance
- Simultaneous localization and mapping (SLAM)

Aerial robotic manipulation
- Design of efficient and interactive systems
- Control, perception and planning for aerial manipulation

Cooperation of multiple aerial systems
- Planning for the cooperation of multiple aerial systems
- UTM/U-space functionalities
- Physically interacting system
# Intelligent navigation for autonomous aerial inspection

## Description

UAV intelligent navigation technology for autonomous aerial inspection based on GNSS, LIDAR and vision. Simultaneous localization and mapping (SLAM) in GNSS-denied environments. Real-time collision avoidance using onboard sensors.

## Potential application

Autonomous aerial inspection for industrial infrastructure. Autonomus and automated non contact NDT inspections using visual sensors.

## Benefits

Minimizing personnel risks, costs (very high in this kind of works) and time. Inspecting different types of defects/malfunction. Reduced inspection time by enlarging the covered area.

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<td>Wind &amp; Solar</td>
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<tr>
<td>Current TRL</td>
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</table>
## Custom aerial manipulator design and development

<table>
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<tbody>
<tr>
<td>Custom UAV with an onboard manipulator. Several manipulator configurations, including two arms and compliant joints. Aerial manipulator is completely automated from take-off to landing.</td>
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<table>
<thead>
<tr>
<th>Potential application</th>
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<tbody>
<tr>
<td>Autonomous aerial inspection of infrastructure with contact using NDT sensors. Detection of defects in wind generator blades and PVT panels.</td>
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https://robotic-aeronautic-tech-foro.b2match.io/page-3781

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Dr. Irene Heras Pérez, Senior Researcher
The Andalusian Foundation for Aerospace Development (FADA) is a non-profit organisation for the management and control of CATEC research centre. The main goal of FADA-CATEC is the research and development in aerospace related technologies, supporting industries in collaboration with universities and other research organizations.

FADA-CATEC develops technology in their three main research areas:

- Materials and Processes
- Avionics and Systems
- Robotics and Automation.

FADA-CATEC has a large experience in developing technological solutions and applications with UAS and aerial robotics as well as in material inspection by non-destructive tests (NDT). They will develop and adapt successful technologies from aerospace sector to create robotic solutions for NDT inspections for O&M in renewable plants.
Main lines of work

Autonomous UAV inspection without contact - Visual
- Autonomous and automated noncontact inspections thorough visual sensor
- Mapping, recognition and detection of visible defects

Autonomous UAV inspection without contact - IR Thermography
- Infrared inspection to analyse large amount of areas, analysis of internal structure defects
- Autonomous and automated aerial inspection georeferenced

Autonomous UAV inspection with contact
- Analysis of internal structure defects not detectable visually or by IR thermography sensors
- Autonomous and automated inspection with contact
### Description

Autonomous aerial visual inspection without contact with Unmanned Aerial Vehicles (UAVs)

### Potential application

Performing autonomous and automated inspections thorough visual sensors, with adaptable solutions for multiple scenarios considering the same inspection systems and reducing costs of bespoken solutions. Mapping, recognition and detection of visible defects

### Benefits

Analyzing large amounts of panels/blades in a short time, so a general overview of an energy plant is achieved at the same time/situation (easy to compare), obtaining a digital register

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<td>Wind and solar</td>
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</table>
## Autonomous UAV inspection without contact - IR Thermography

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<th>Description</th>
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<tbody>
<tr>
<td>Autonomous aerial inspection through infrared thermography (non contact) for O&amp;M in renewable energy plants with Unmanned Aerial Vehicles (UAVs)</td>
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<table>
<thead>
<tr>
<th>Potential application</th>
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<tbody>
<tr>
<td>Performing autonomous and automated non contact NDT inspections thorough infrared camera. Analyzing defects in solar panels, failures in absorber tubes or lack of efficient in molten salt tanks isolation of CSP Plants, not visually detectable</td>
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<tr>
<td>Analyzing large amounts of panels/blades in a short time, so a general overview of the Plant is achieved at the same period of time/situation obtaining a digital register (georeferencing picture)</td>
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Autonomous UAV inspection with contact

Description
Autonomous aerial inspection with contact for O&M with Unmanned Aerial Vehicles (UAVs). This technology allows analyzing internal surface structure defects not detectable visually or by IR thermography sensor, thorough an ultrasonic sensor.

Potential application
Autonomous aerial inspection with contact thorough an ultrasonic sensor to analyze internal structural defects in wind generator blades, such as: detection of structure failures, mapping composite delamination or interface disbound in wind generator blades.

Benefits
Performing autonomous and automated NDT inspections where contact is required thorough ultrasonic sensor, without additional support, minimizing personnel risks, costs and time.

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<thead>
<tr>
<th>Category</th>
<th>Aerial manipulation</th>
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<tbody>
<tr>
<td>Application field</td>
<td>Wind farms</td>
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<td>Current TRL</td>
<td>3</td>
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</table>
If you are interested in requesting a B2B meeting, please do not hesitate to contact us to know more about the development of our technologies.

Entity: CATEC. Advanced Center for Aerospace Technologies
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Technical presentations

WP4 webinars
The University of the West of England, Bristol, is a public research university situated in the city of Bristol, in the United Kingdom.

Bristol Robotics Laboratory: largest academic centre for multi-disciplinary robotics research in the UK

**DURABLE Team:**

**Dr. Matthew Studley** – Associate Head of Department - Engineering Design and Mathematics (Research and Scholarship)

**Dr. Steve Wright** – Senior Research Fellow, Avionics and Aircraft Systems

**Joonas Neelov** – Research Associate (Aerial Robotics)
Main lines of work

Custom UAV design and manufacture

- Bespoke multi-rotor UAV platforms for a variety of payloads
- Significant payload mass variation
- Significant operational environment variation
- High performance at relatively low cost
Custom UAV design and manufacture

**Description**

Custom multi-rotor UAVs for a wide variety of payloads and sensors. Payload and sensor mass variation: 100g to 10kg. Flight endurance: 30 - 60 minutes, 90 minutes max. Environmental resistance: Cold, hot, wet and windy.

**Potential application**

Automated visual and thermal inspection of PV solar panels. Flying payloads developed by other DURABLE partners. Onboard real-time data collection and processing using machine learning.

**Benefits**

Relatively low-cost, high-performance airborne platform. Aircraft adapted for specific payload, mission and environment. Provable reliability for aircraft systems.

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<tr>
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Do not forget to request B2B meeting, please...

https://robotic-aeronautic-tech-foro.b2match.io/page-3781

Entity: University of the West of England, Bristol
Contact Person: Dr. Matthew Studley, Dr. Steve Wright, Joonas Neelov
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Website: https://www.uwe.ac.uk/
Technical presentations

WP4 webinars
Instituto Superior Técnico (IST)

• IST is the largest Engineering School in Portugal, with 19 undergraduate, 32 master and 33 PhD programmes.

• IST has 3 campus, more than 11,000 students (9% are PhD students, 21% of which are international) and 870 Professors/Researchers.

• IST accommodates 23 R&D units, with a total of 1,200 PhD and 10 departments.

• IST regularly participates and leads European, International and National R&D projects in Robotics.
Main lines of work

**Inspection with autonomous mobile robots**
- Remote inspection / manipulation
- Logistics management for optimization
- Cooperation of multiple robots in operation

**Guidance, navigation and control of robots**
- Security deployment with obstacle detection and avoidance.
- Mapping, planning and scheduling operations

**3D reconstruction**
- Planning and practice of operation and protocols with Virtual Reality/Augmented Reality.
- Human machine interface
Autonomous UGV inspection without contact

### Description

Autonomous UGV performing inspection of solar panels with contactless technologies, such as cameras, depth sensors, sonars.

### Potential application

UGV equipped with sensing technologies to perform inspection operation on solar panels without contact.

Useful mainly for maintenance operators and pilots.

### Benefits

Efficient remote inspection / manipulation. Opportunity of inspection during solar panels operation or during shutdown at night, and without operators in the field.

Logistics management to optimize the planned trajectories and sequence of operations, as well as the coordination of multiple UAVs and UGVs in simultaneous operations.

<table>
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<tr>
<th>Category</th>
<th>Ground inspection</th>
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<tr>
<td>Application field</td>
<td>Solar</td>
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<td>Current TRL</td>
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</tbody>
</table>
## Autonomous UGV inspection with contact

### Description

Autonomous UGV performing **inspection of solar frames** with contact technologies, such as **robotic manipulators** installed on the UGV to manipulate solar panels while performing inspection.

### Potential application

Robotic manipulators installed on UGV with specific technologies at the end effector to perform **inspection and maintenance operations in interaction with solar panels.** Useful mainly for **maintenance operators and pilots**

### Benefits

**Micro inspection** of the photovoltaic plates to detect **cracks, bubbles and dirt** on the panels. Ability to use **more than one manipulator** at the same time. Operations during day or night, **without human support in the field**.

### Table

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Guidance, navigation and control of an UGV

**Description**

Guidance, navigation and control (GNC) of an Unmanned Ground Vehicle (UGV), i.e., *localization in real-time* in a given scenario, *path planning* and *path following*, *obstacle detection and avoidance*.

**Potential application**

*Navigation of UGV in solar farms and wind farms.* To perform inspection/maintenance operations and to provide support in a particular panel, set of panels or in the global farm without human guidance neither manual mapping.

**Benefits**

*Security and surveillance* with obstacle detection and avoidance. *Plan and schedule automatic operations* in the farm, where transportation is required. *Logistic managements* to optimize the sequence of operations, sequence of panels and *cooperation of multiple UGV in operation*.

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</table>
## Ground mobile support

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<tbody>
<tr>
<td>A UGV is able to provide <strong>support for UAV</strong>, namely <strong>power support</strong> as a <strong>mobile charging station</strong>, <strong>communication support</strong> as a mobile repeater and a <strong>mobile landing platform</strong>.</td>
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<table>
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<tr>
<td>UGV to provide support of guidance, communication and charging to <strong>keep a fleet of UAV in continuous operation of inspection and maintenance of solar and wind farms</strong>. Mobile charging station for the drones. Useful mainly for <strong>maintenance operators and pilots</strong>.</td>
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3D Reconstruction

**Description**

Mapping the scenario in a 3D reconstruction able to support navigation, Virtual Reality and Augmented Reality needs.

**Potential application**

Validation of 3D reconstruction in solar farms and wind farms. Planning and practice of operation and protocols with VR/AR. Track the status of the fleet of UAV/UGV. Useful mainly for maintenance operators and pilots.

**Benefits**

Logistics management to optimize the planned trajectories and sequence of operations, as well as the coordination of multiple UAV and UGV in simultaneous operations. Characterization of the environment for monitoring vegetation to prevent shadows appearing on solar panels (trees, buildings, etc.).

<table>
<thead>
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LORTEK

WP4 webinars (2, 8 & 22 April 2020)

Lexuri Vazquez - LORTEK
LORTEK TECHNOLOGICAL CENTRE

- LORTEK is a non-profit private technological centre highly specialised in advanced manufacturing and smart factories, specially in **joining technologies, additive manufacturing and industry 4.0 technologies including non destructive testing techniques** applied to metallic materials.

- Our **goal** is to generate and transfer excellent knowledge, based on the state of the art technologies, to multisectorial industrial network in order to improve their competitiveness.
Main lines of work

Joining technologies
- Laser, electric arc, friction, resistance spot and flash.
- Applied to a wide extension of metallic materials.

Additive manufacturing
- Powder bed fusion and directed energy deposition technologies.
- Manufacturing and repairing from CAD files of high complex geometries and/or large with minimum waste of material and short lead times.

Inspection by NDTs
- Active thermography based on induction and optical (flash and halogen lamps) excitation experience.
- Process monitoring via passive thermography.
- Defect detection in metallic and non-metallic components.
### Description
Additive manufacturing PBF technology that uses **metallic powder** as feedstock and **laser** as power source for the manufacturing of **highly complex and detailed parts**. It only needs a CAD file with the design of the part and material to obtain the part in a short lead time and with high accuracy.

### Potential application
Maintenance operations like **manufacturing of broken parts** on demand for substitution **avoiding long stoppages**.

### Benefits
Efficiently supporting the O&M activities for **substitution operations**:
- manufacturing of **new parts** in a short lead time
- possibility of **redesign** for weight saving
- possibility to avoid numerous part assemblies
- maximum **material savings**
- no need of stock
- no need of large production

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<td>Application field</td>
<td>Repairing and fabrication</td>
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MAM-LMD (Laser Metal Deposition)

**Description**
Additive manufacturing DED technology that uses **metallic powder** as feedstock and **laser** as power source for the manufacturing and **repairing of complex and high value added parts**. It only needs a CAD file with the design of the part or the add-on and material to obtain the final part in a short lead time.

**Potential application**
Reparation of complex and detailed high value **broken parts or worn surfaces** avoiding long stoppages. Formation of **protective coatings** for extended live.

**Benefits**
Efficiently supporting the O&M activities for **repairing operations**:
- reparation of **broken parts** in a short lead time
- **extended life** of parts
- **high quality reparations**
- material savings
- no need of stock

**Category** | **Additive manufacturing**
---|---
**Application field** | **Repairing and fabrication**
**Current TRL** | **6**

Lexuri Vazquez - LORTEK
MAM-WAAM (Wire and Arc Additive Manufacturing)

**Description**
Additive manufacturing DED technology that uses **metallic wire** as feedstock and **electric arc** as power source for the **manufacturing and repairing** of **large** dimensions parts. It only needs a CAD file with the design of the part or the add-on and material to obtain the final part in a short lead time.

**Potential application**
Fabrication and reparation of broken large parts avoiding long stoppages.

**Benefits**
Efficiently supporting the O&M activities for **substitution and/or repairing** operations:
- manufacturing and reparation of broken parts in a short lead time
- extended life of parts
- maximum material savings
- possibility to avoid numerous part assemblies
- no need of stock
- no need of large production

**Category**  Additive manufacturing

**Application field**  Repairing and fabrication

**Current TRL**  6

Lexuri Vazquez - LORTEK
**Description**

Thermography (IRT): Non destructive technique in which the infrared radiation of the surface of a component is measured in order to detect possible defects that affect heat dissipation. **Active thermography** includes an excitation source to increase the temperature and generate heat flux on the piece. Excitation sources:

- Laser
- Flash / Halogen lamps
- Induction

**Potential application**

- Defect detection in metallic and non-metallic components.
- Inspection of solar panels during non-active phase.
- Wind turbine inspection, assembled and disassembled.

**Benefits**

- Clean
- Repeatable
- Automatization
- Easily interpretable results

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**Category** | NDT
---|---
**Application field** | Defect detection
**Current TRL** | 5
Inspection by NDTs (Passive Thermography)

**Description**
Thermography (IRT): Non destructive technique in which the infrared radiation of the surface of a component is measured in order to detect possible defects that affect heat dissipation. **Passive thermography** benefits from the heat generated during a process in order to detect unusual thermal behavior.

**Potential application**
- Lifetime assessment and process monitoring.

**Benefits**
- Clean
- Repeatable
- Automatization
- Easily interpretable results

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Inspection by NDTs (Electroluminiscence)

Description

Electroluminiscence (EL): EL measurements take advantage of the radiative inter-band recombination of excited charge carriers in solar cells. It consists of applying a direct current to the PV module and measuring the photoemission by means of an infrared-sensitive camera. EL imaging provides insight into micro cracks and other defects within the cell material:

- detecting electrical inhomogeneities caused by intrinsic defects: (e.g. grain, boundaries, dislocations, shunts or other process failures)
- extrinsic defects: (e.g. cracks or interrupted contacts)

Potential application

- Inspection of solar panels during non-active phase.

Benefits

Clean
Repeatable
Automatization
Easily interpretable results

Category | NDT
Application field | Defect detection
Current TRL | 5

Pablo López de Uralde- LORTEK
If you are interested in requesting a B2B meeting, please send a request to **Pablo Lopez de Uralde (NDTs)** and/or **Lexuri Vazquez (AM)**. Thank you.

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**Entity:** LORTEK  
**Contact Person:** Lexuri Vazquez  
**Telephone number:** +34 943 88 23 03  
**Email:** lvazquez@lortek.es / plopez@lortek.es  
**Website:** www.lortek.es
Radio Emission Spectroscopy for Wind Turbine Systems

DCU – Dublin City University

Prof. Patrick McNally & Alessio Di Liberto

patrick.mcnally@dcu.ie
alessio.diliberto@dcu.ie
• Prof. McNally is a world leader in the field of **advanced x-ray diffraction imaging technology**, **non-destructive radio frequency metrology for plasma processing** (Radio Emission Spectroscopy), and **copper halide materials**. He served as Head of the School of Electronic Engineering in DCU and is currently a Funded Investigator in Science Foundation Ireland's Advanced Manufacturing Research Centre (I-FORM) and Co-Director of the Nanomaterials Processing Laboratory (NPL) in DCU.

• Alessio Di Liberto is a Microwave and RF Designer Engineer with around 15 years of international experience on **Military defence systems** (Electronic Warfare), **Aerospace guidance and surveillance devices**, **RF ID-Identification and Tracking devices (RFID)** using mixed RF techniques, **IoT (Internet of Things) devices** for control and collection of remote data using multi RF/Internet based hybrid solutions.
Main lines of work

Phase ALPHA
- DATA COLLECTION of RF emissions in the range 1 kHz – 2 GHz
- COTS devices at this stage (e.g. SDR)

Phase BETA
- DESIGN of Experiment (DoE)
- HW and SW OPTIMIZATION

Phase GAMMA
- First PROTOTYPE/CONCEPT
- PRE-ENGINEERING documentation
"Radio Emission Spectroscopy: Near/Far Field Sensors"

**Description**

Customized E-FIELD and B-FIELD sensors (ELECTRIC and MAGNETIC FIELDS) on board drones connected to dedicated electronic circuitry (HW and SW)

**Potential application**

Remote health/status check analysis of wind turbines from drones

**Benefits**

- Reliability of measurements
- No human resources needed in loco
- Time and money saving

<table>
<thead>
<tr>
<th>Category</th>
<th>Arial Inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application field</td>
<td>Wind &amp; Solar</td>
</tr>
<tr>
<td>Current TRL</td>
<td>3</td>
</tr>
</tbody>
</table>
"Smart Grid intelligent sensors"

**Description**

Smart grid network using RF intelligent sensors inside wind turbines nacelles connected through *ad hoc wireless network* (e.g. mesh network) to share relevant data remotely.

**Potential application**

Remote health/status check analysis of wind turbines using a Gateway on board of a drone.

**Benefits**

- Real time monitoring of an entire site at once (no single turbines)
- Remote access to data through secured Internet (e.g. IPv6)

**Category**

Arial Inspection

**Application field**

Wind and solar

**Current TRL**

2
If you are interested in requesting a B2B meeting, please do not hesitate to contact us to know more about the development of our technologies

Entity: DCU – Dublin City University
Contact Person: Alessio Di Liberto
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Email: alessio.diliberto@dcu.ie
Website: www.eeng.dcu.ie/npl/
Technical presentations

WP4 ESTIA webinars
The ESTIA campus is an ecosystem which includes the following activities:

- **ESTIA – Formation Education**: Engineering school, bachelor, lifelong training
- **ESTIA – Entreprendre Entrepreneurship**: 3 thematic nurseries
- **ESTIA – Recherche Research**: Researchers teams & technical platforms

ESTIA manages 5 technical platforms.

Among the Research platforms, one is specialized in Human-Systems Interactions and develops research activities in augmented and virtual reality, with a dedicated prototyping platform named **PEPSS**. **Compositadour** is the technical platform from ESTIA specialized in the robotized processes for placement of composite materials.

Research Platforms Activities (1/2)

PEPSS
HUMAN FACTORS FOR INTERACTIVE TECHNOLOGY

COMPOSITADOUR
COMPOSITES & ROBOTICS SOLUTIONS

ADDIMADOUR
ADDITIVE MANUFACTURING SOLUTIONS
Who we are

Research Platforms Activities (2/2)

SIMECOMP
NUMERICAL SIMULATION

ENERGEA
ENGINEERING FOR RENEWABLE ENERGIES
Mixed Reality (MR) Remote vehicle control

**Description**

Virtual cockpit designed to be visualised into a 3D MR immersive system like HTC Vive. The cockpit allows to remote control a vehicle by physical interactors (SAITEK X52 e.g.).

**Potential application**

Remote vehicle driving useful mainly for maintenance operators and pilots. Supervise & Control an UAV vehicle army with a global 3D. Application fields: entertainment, industrial, training.

**Benefits**

- Advanced control, Easy to transport
- Customizable per operator
- Costless to maintain than a physical cockpit
- Flexible for future functionality
- Get surrounding environment
- Augmented reality displaying of real world additional information
- Same environment for training & operating

**Category** | Remote control
---|---
**Application field** | wind&solar
**Current TRL** | 2
Mixed Reality (MR) Remote arm robot control

<table>
<thead>
<tr>
<th>Description</th>
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<tbody>
<tr>
<td>From the virtual cockpit the pilot is able to remote control a robot arm by biomimetism through the use of a mocap (motion capture) system.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Potential application</th>
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</thead>
<tbody>
<tr>
<td>The natural interaction by using the pilot’s own arm for biomimetism remote controlling facilitates the part manipulation and repairing. Useful mainly for maintenance operators and pilots.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Benefits</th>
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</thead>
<tbody>
<tr>
<td>▪ Advanced remote control by natural interaction</td>
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<tr>
<td>▪ Reduce cost of maintenance</td>
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<tr>
<td>▪ Allow to train a IA by biomechanical learning for future automatisation</td>
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</table>

<table>
<thead>
<tr>
<th>Category</th>
<th>Remote control</th>
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</thead>
<tbody>
<tr>
<td>Application field</td>
<td>wind&amp;solar</td>
</tr>
<tr>
<td>Current TRL</td>
<td>2</td>
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</tbody>
</table>
Abrasive water jet blind machining

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<thead>
<tr>
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<tbody>
<tr>
<td>Portable robot for composite repair. It is a machine using water jet abrasion technology. It is the only handy system (&lt;50kg) adapted to composite repair machining. It is composed of a portable machining robot linked to a mobile ground station.</td>
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</table>

<table>
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<tr>
<th>Potential application</th>
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<tbody>
<tr>
<td>Patented effluent skimmer that drives out all carbon dust. It favors a wholesome atmosphere for human and technical environment. Guaranty of an automation with a maximum of simplicity of use and constant depth working</td>
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<table>
<thead>
<tr>
<th>Benefits</th>
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<tbody>
<tr>
<td>▪ Fast and efficient repairing of pieces</td>
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<td>▪ Efficient repair on site thanks to portable equipment</td>
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</table>

<table>
<thead>
<tr>
<th>Category</th>
<th>Repairing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application field</td>
<td>wind&amp;solar</td>
</tr>
<tr>
<td>Current TRL</td>
<td>4</td>
</tr>
</tbody>
</table>
If you are interested in requesting a B2B meeting, please follow these steps depending of the purpose:

- About possible industrial partnership & research project opportunities. Please contact Olivier LARRE by the b2b tools or at o.larre@estia.fr
- If you have any technical questions about the water jet technology please contact Guillaume BAILLOU by the b2b tools or at g.baillou@estia.fr
- If you have any technical questions about the virtual cockpit & the bi-arm robot presented please contact Patxi BERARD by the b2b tools or at p.berard@estia.fr

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