HEU Marie Skłodowska-Curie Actions – Doctoral Network

IntelliWind: Intelligent Systems for autonomous Wind power plant operations

Info webinar for prospective doctoral candidates, 11-09-2024

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101168725

Outline

- What is a MSCA Doctoral Network?
- Why do we focus on autonomous operations and what do we mean by it?
- Project outline: objectives, work packages, partners
- One-by-one description of PhD projects
- How to apply

+ Q&A (send questions and upvote other questions through an interactive poll)

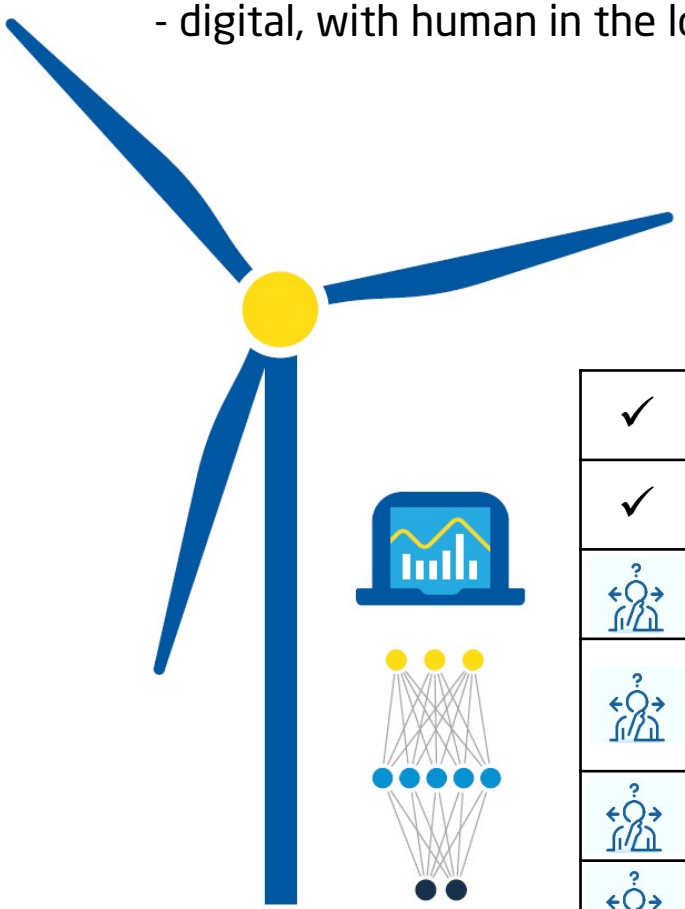
What is a MSCA Doctoral Network?

- A network of individual PhD projects working in a common theme
- Strong competition in the proposal stage ==> winning projects are high-quality!
- Strong focus on providing excellent training and establishing a clear career path
- The network setup facilitates teamwork, social interactions and friendships
- Mobility: multiple events and exchanges/external stays
- A dramatic expansion of your professional network

Characteristics of autonomous operation

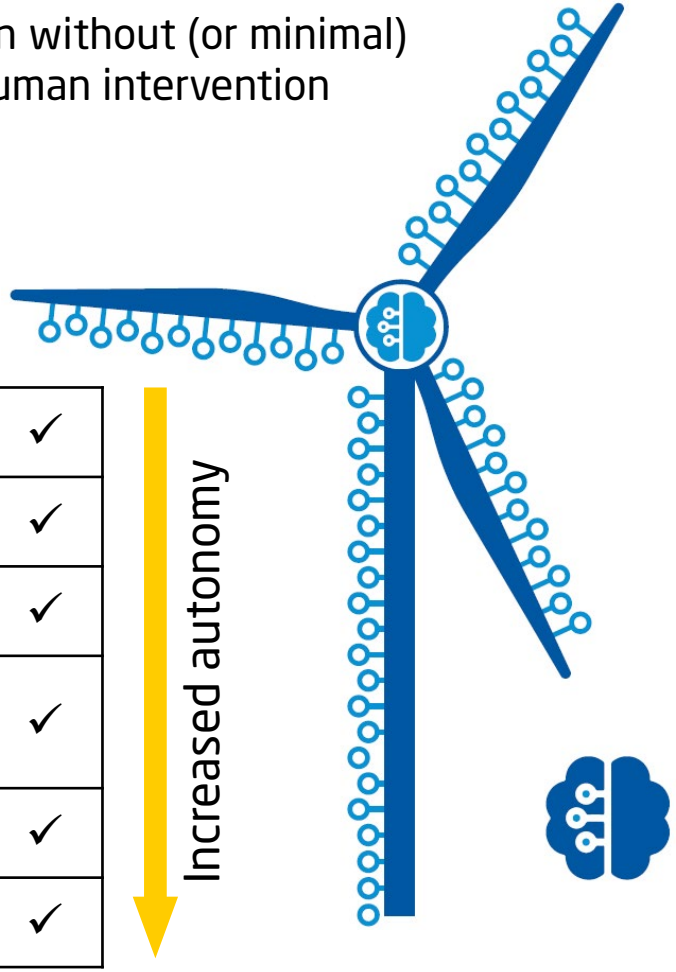
Current technology:
- digital, with human in the loop

Fully autonomous systems:
- operation without (or minimal) human intervention



✓	Automatically reacts to current operating conditions	✓
✓	Transmits data, executes remote commands	✓
	Assessment of current health state	✓
	Automatically evaluates available actions based on current state and performance KPI estimates	✓
	Proposes actions / work orders	✓
	Executes actions without human intervention	✓

Increased autonomy



Impacts of autonomous operation

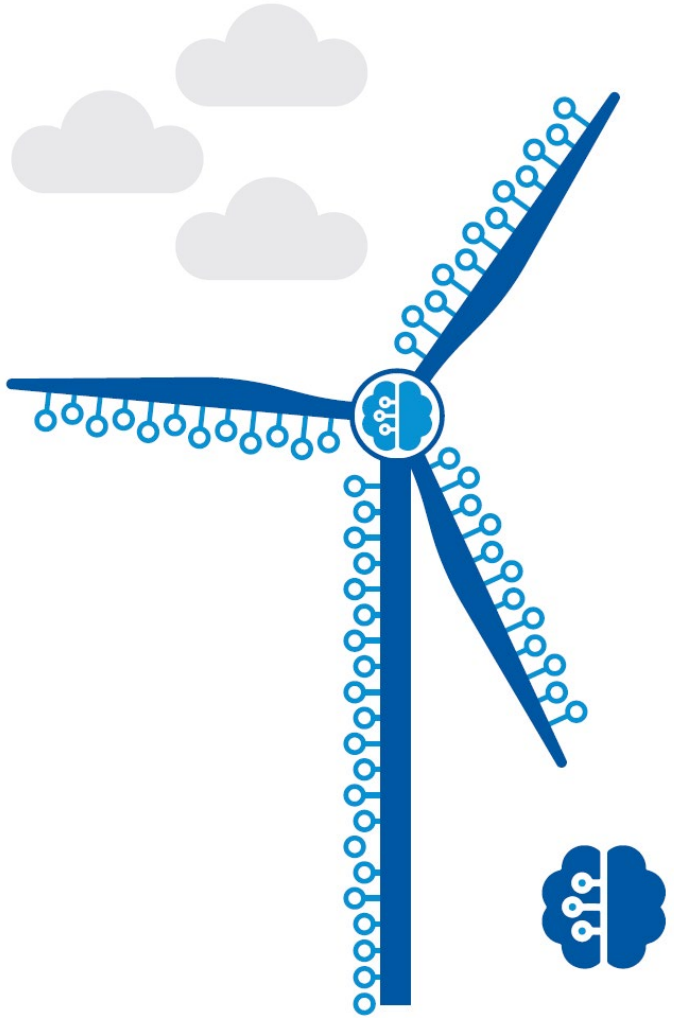
- Reduction of the **cost of energy**:
  - Optimized operations
  - More condition-based maintenance
  - Labor efficiency

... And not necessarily just cost reductions! - but also:

- **Consistency** of outcomes

- It's not about eliminating humans entirely –
  - rather each person can **do more with the same effort**

  The latter entails a **major shift in job profiles**



Elements of an autonomously operating application

What is the current state of the asset? How will it progress?	What are the options for controlling and mitigating the current state?	What is the optimal operation strategy and how to execute it?	Can we trust the prescriptions of an algorithm?
• Sensors • Data acquisition • Diagnostics • Prognostics	• Control • Maintenance actions and strategies • Scenarios, simulations • Impact assessment	• Decision modelling • Generating work orders	• Trustworthiness • Uncertainty quantification • (Cyber) security

Questions? Go to www.menti.com and enter code 3335 9022

IntelliWind: project objectives

Obj. No.	Description
RO1	Develop **data acquisition, diagnostics, and prognostics** methodologies that automatically provide the appropriate information basis for autonomous decision making.
RO2	Develop a catalogue **of automated mitigation actions and their associated impacts**, for a set of critical, labour-intensive wind turbine operation use cases.
RO3	Build a **decision-making pipeline** covering the entire chain from information processing, through insights, to optimal business decisions, by developing and implementing innovative modelling, logics, and optimisation methodologies, featuring feedback mechanisms for self-learning, and enhancing the prediction capability.
RO4	Propose solutions for the **integration** of the innovative technologies in the **business**.
RO5	Establish the **trustworthiness, robustness, safety, security, and compliance** of proposed autonomous operation solutions through uncertainty quantification, explainability, and robustness studies.

Questions? Go to www.menti.com and enter code 3335 9022

IntelliWind

Intelligent systems for autonomous wind power plant operation

Lower operating costs *Less time spent on manual maintenance* *Fewer urgent interventions*

RO1
Diagnostics and prognostics - understanding the current state of your asset

RO2
Mitigation actions - knowing what are the available options for action

RO3
Autonomous decision making - what is the optimal strategy at any time

RO4, RO5
How to implement and ensure the trustworthiness of an autonomous system

WP3
Data, diagnostics and prognostics for decision making
- Automatic sensor data interpretation
- Anomaly detection
- Prognostics

DC1 DC2 DC3 DC4

WP4
Design and impact assessment of autonomous actions
- Reinforcement learning based control optimization
- Adaptive loads control
- Digital twins

DC5 DC6 DC7 DC8

WP5
Optimal decision making
- Optimal sequential decision making
- Sim2reality gap

DC9 DC10 DCA1

WP6
Trustworthy decision process and implementation
- Uncertainty quantification
- Explainability
- Cyber-security

DC11 DC12 DC13 DC14 DC15

THE FUTURE LEADERS OF TRANSFORMATIONAL CHANGE

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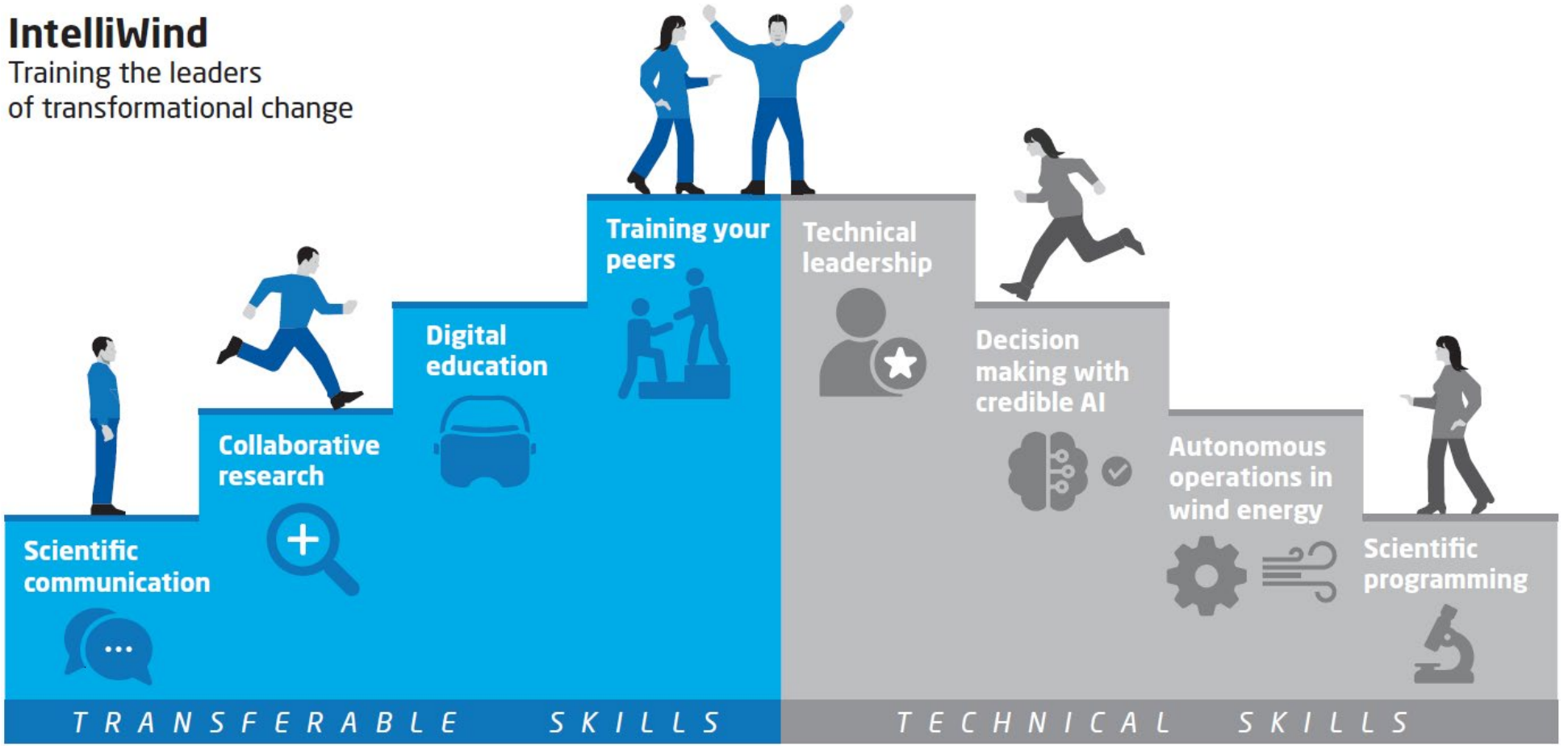
Training concept



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THE FUTURE LEADERS OF TRANSFORMATIONAL CHANGE

WP2 *Training for professional impact* T01, T02, T03

Interdisciplinary technical training:

- Wind energy domain science
- Computer science and data science
- Applied mathematics and decision theory
- Immersion and practical experience with industry challenges

Transferable skills training, with focus on dissemination and innovation/leadership training:

- Presentation and communication
- Hands-on training in course development
- Hands-on with software development and organizing hackathon challenges
- Innovation and leadership training
- VR-based training
- Collaborative research, code development and scientific writing

Collaborative hands-on work:

- Coding boot camps
- VR workshops
- Scientific challenge series
- Collaborative papers

WP7 *Dissemination, Exploitation & Communication*

Collaborative position papers on autonomous wind operation

Open source software: tool and solution catalogue

External hackathon

Professional education course on Autonomous Systems in Wind Energy

Workshops and conference presentations

Outreach to general public

WP1 *Coordination*

Questions? Go to www.menti.com and enter code 3335 9022

Example use cases

Description	Assets involved	Current work approach and challenges faced	Automation opportunity
Interpretation of monitoring data (such as SCADA alarms)	Wind turbines	Alarms trigger many unscheduled stops. The alarms do not provide complete diagnostics information, manual analysis is necessary.	Automated, real-time diagnostics and commands for automatic restarts
Blade monitoring	Blades	Prognostics models manually set up. Periodic inspection and maintenance rather than condition based.	Automatic real-time blade health index. Inspection work orders triggered by health index. Automated inspections and interpretation.
Optimal component maintenance	Drivetrain components, bolts, support structure	Maintenance being reactive and preventive. Anomaly flagging is digital, but interpretation is manual. Large uncertainties in predictive models, difficult to optimise maintenance scheduling.	Condition-based maintenance with automatic maintenance scheduling by improving interpretation, prognostics, and considering uncertainty
Closed-loop control	Wind turbines and farms	A fixed choice of predefined wind farm control strategies available to operators.	Turbine/farm control adapting to the current state of asset and objectives

Questions? Go to www.menti.com and enter code 3335 9022

Project details

PARTNERS

DTU
ETH
Vestas
UCLM
OCEAN WINDS
TU Delft
ENGIE digital
SYDIS
U.PORTO
QUANTIA
SIEMENS
RTDT
IWES
RAMBØLL
VATTENFALL

KEY FIGURES

- Duration 2024 – 2028 (4 years)
- 18 partners (9 beneficiaries + 9 associate) from 8 countries
- 16 PhDs, expected starting date around January 1st, 2025
- Each PhD project in collaboration with an industrial (non-academic) partner

Questions? Go to www.menti.com and enter code 3335 9022

The IntelliWind team and PhD projects

Questions? Go to www.menti.com and enter code 3335 9022

DC1 Maintenance and Operations-Driven Prognostics: A Collaborative Methodology

THE HOST TEAM

Steffen Czichon:

- Head of department – blades. Blade digital twinning control and AI applications in wind energy systems.

IWES

Julia Walgern:

- Group manager technical reliability. Data science, reliability, ML&AI)

Nick Eleftheroglou:

- Assistant Professor, PHM, prognostics, AI, stochastic modeling, predictive maintenance.
- Head of the intelligent Sustainable Prognostics (iSP) Group

TU Delft

THE NON-ACADEMIC PARTNER

IWES

The project primary location is at IWES Fraunhofer, in the Hamburg / Bremerhaven area

THE PROJECT

- Development of a novel prognostic model that will not only factor in maintenance actions but also adapt to unseen loading operational conditions
- The prognostic methodology is based on extending Markov models through Bayesian techniques
- Demonstrate the methodology on a wind turbine blades use case

THE ACADEMIC CO-SUPERVISION PARTNER

UCLM

(University of Castilla-La Mancha)

Estefania Artigao:

- Assistant Professor, O&M, ML, reliability, fault detection, predictive maintenance, drive train monitoring
- Deputy director of Quality and Business Relations at UCLM

DC2

Advanced measurement and data-driven techniques for automated structural assessment

THE HOST TEAM

Silvia Vettori:

- Research engineer, structural dynamics and environmental testing.
- Obtained a PhD through the MSCA DN "DyVirt", work on virtual sensing

SIEMENS

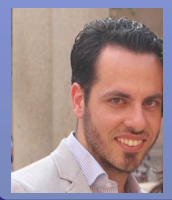
Filipe Magalhães

- Associate Professor, 20+ years of experience on the monitoring of structures and development of innovative tools for data processing.
- Databases with unique experimental data. Close collaboration with industry

U.PORTO

THE INDUSTRY PARTNER

SIEMENS



The project primary location is at Siemens Digital Industries Software, Brussels, Belgium

SISW plays a crucial role in the digitalization of industries through its comprehensive portfolio of hardware, software and service solutions.

Emilio Di Lorenzo:

- Team Lead - Structural Dynamics and Environmental Testing

THE PROJECT

- Exploit advanced measurement techniques and implement powerful ML approaches for automated identification of deviating patterns from the structural healthy state.
- Develop, combine, and synchronize several optical measurement techniques (camera-based, optical fibres, and optical accelerometers) with conventional measurements;
- Implement data-driven automated system identification and damage detection methods.

THE ACADEMIC CO-SUPERVISION PARTNER

ETH

(ETH Zurich)

Eleni Chatzi:

- Professor, Chair of Structural Mechanics and Monitoring.
- Outstanding research record and ERC Grant award
- Currently the president of the EAWE (European Wind Energy Academy)

Questions? Go to www.menti.com and enter code 3335 9022

DC3

Adaptability, flexibility, and generalizability of AI for fault detection

THE HOST TEAM

Estefania Artigao:

- Assistant Professor, O&M, ML, reliability, fault detection, predictive maintenance, drive train monitoring
- Deputy director of Quality and Business Relations at UCLM

Emilio Lazaro:

- Professor, Modelling of wind turbines, steady-state and dynamic analysis, O&M, predictive maintenance, AI.

UCLM

THE INDUSTRY PARTNER

OCEAN WINDS

Ignacio Navas Pascual

- Data scientist in Operational Infrastructure and Performance for wind farms at OceanWinds.

THE PROJECT

- Identify and characterise different scenarios that will allow generalizability of AI methods;
- Quantify the impact of extreme events on adaptability and flexibility of AI techniques;
- Develop a combination of data preprocessing, data cleaning, and advanced AI algorithms to face heterogeneity, scalability, and outlier handling for autonomous condition monitoring;
- Quantify the adaptability and flexibility of wind turbine modelling for fault detection under different scenarios

THE ACADEMIC CO-SUPERVISION PARTNER

TU Delft

iSP

Dimitrios Zarouchas:

- Associate Professor, Director of Center of Excellence in AI for Structures, PHM.

Questions? Go to www.menti.com and enter code 3335 9022

DC4

Enhanced wind turbine lifetime management through automated data processing and bespoke sensing

THE HOST TEAM

João Santos

- Head of Innovation and Digital Transformation
- Data science, sensing, AI an ML

VENTIENT

Filipe Magalhães

- Associate Professor, 20+ years of experience on the monitoring of structures and development of innovative tools for data processing.
- Databases with unique experimental data. Close collaboration with industry

U.PORTO

THE INDUSTRY PARTNER

Ventient: major asset operator in multiple EU countries.
Ventient's Porto office is the primary employment location

VENTIENT

João Santos

- Head of Innovation and Digital Transformation
- Data science, sensing, AI an ML

THE PROJECT

- Propose an optimised sensor network to be deployed at bottom fixed and floating wind farms for accurate quantification of fatigue consumption;
- Produce unique databases of monitoring data combining operation variables with structural and mechanical response;
- Develop data processing techniques merging data from diverse sources and adopting population-based strategies;
- Develop tools to automatically suggest maintenance interventions and operation optimisation

THE ACADEMIC CO-SUPERVISION PARTNER

ETH (ETH Zurich)

Eleni Chatzi:

- Professor, Chair of Structural Mechanics and Monitoring.
- Outstanding research record and ERC Grant award
- Currently the president of the EAWE (European Wind Energy Academy)

Questions? Go to www.menti.com and enter code 3335 9022

DC5

Design of automatic maintenance recommendation system for wind turbine components

THE HOST TEAM

Athanasios Kolios:

- Professor, Reliability, lifecycle cost modelling, O&M optimization.
- Vast experience in international projects and industry collaboration

Nikolay Dimitrov:

- Senior researcher, specializing in applied statistics and probabilistic design, data science, ML.
- Interested in data science, optimization of design and operations, decision making under uncertainty.
- Leading major EU-funded projects (Hiperwind, IntelliWind)

DTU

THE INDUSTRY PARTNER

VATTENFALL

Kira Kaufmann:

- Systems Engineer, focus on data and risk driven Operation and Maintenance

Jan Henning Jürgensen:

- Asset integrity, predictive maintenance, analytics, background in electrical engineering and business leadership

THE PROJECT

- Design an automated component monitoring and maintenance recommendation system for bolts
- Automatically estimate individual bolt tension through processing of sensor signals;
- Estimate the likelihood of loss of tension of a bolted tower flange connection;
- Design automatic work orders that recommend a list of bolted joints to be tensioned throughout a wind turbine portfolio

THE ACADEMIC CO-SUPERVISION PARTNER

(TU Munich)

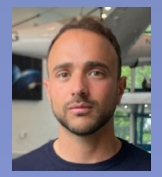
Daniel Straub:

- Professor, expert in probabilistic modeling, risk assessment, reliability analysis and data analytics applied to engineering systems.
- Outstanding research record and consultancy experience
- Head of the Engineering Risk Analysis Group

DC6

Predictive Prognostics and Adaptive Load Control: An Integrated Approach to Wind Turbine Blade Longevity and Efficiency Optimization.

THE HOST TEAM



Nick Eleftheroglou:

- Assistant Professor, PHM, prognostics, AI, stochastic modeling, predictive maintenance.
- Head of the intelligent Sustainable Prognostics (iSP) Group

Julie Teuwen:

- Associate Professor, manufacturing, wind turbines, composites.

Dimitrios Zarouchas:

- Associate Professor, Director of Center of Excellence in AI for Structures, PHM.

THE NON-ACADEMIC PARTNER

Steffen Czichon:

- Head of department – blades. Blade digital twinning control and AI applications in wind energy systems.

THE PROJECT

- Developing an interpretable prognostic model along with an uncertainty management strategy to estimate the conditional reliability and Remaining Useful Life (RUL) of wind turbine blades.
- Designing a self-learning control algorithm that adjusts blade loading in real-time based on the predicted RUL, conditional reliability, and current health state to optimize energy output and reduce maintenance requirements.
- Experimentally validating the developed control algorithm.

THE ACADEMIC CO-SUPERVISION PARTNER

Nikolay Dimitrov:

- Senior researcher, specializing in applied statistics and probabilistic design, data science, ML.
- Interested in data science, optimization of design and operations, decision making under uncertainty.
- Leading major EU-funded projects (Hiperwind, IntelliWind)

DC7

Design of optimal mitigation actions through digital twinning

THE HOST TEAM

Filipe Magalhães

- Associate Professor, 20+ years of experience on the monitoring of structures and development of innovative tools for data processing.
- Databases with unique experimental data. Close collaboration with industry

U.PORTO

THE INDUSTRY PARTNER

Ventient: major asset operator in multiple EU countries.
Ventient's Porto office is the primary employment location

VENTIENT

João Santos

- Head of Innovation and Digital Transformation
- Data science, sensing, AI an ML

THE PROJECT

- Develop reliable digital twins with limited information of the turbine;
- Develop a strategy based on experimental testing and monitoring data to automate the construction and verification of digital twins;
- Optimise operation and implementation of mitigation actions with the support of digital twins

DTU

THE ACADEMIC CO-SUPERVISION PARTNER (DTU)

Athanasios Kolios:

- Professor, Reliability, lifecycle cost modelling, O&M optimization.
- Vast experience in international projects and industry collaboration

Questions? Go to www.menti.com and enter code 3335 9022

DC8

Reinforcement learning based wind farm control optimization

THE HOST TEAM

Tuhfe Göçmen:

- Senior researcher, specializing in data-driven wind farm control and AI applications in wind energy systems.
- A "Wind Farm Control Rock Star" with extensive experience in data analytics.
- Leading major EU-funded projects (TWAIN, DigiWind)

Nikolay Dimitrov:

- Senior researcher, specializing in applied statistics and probabilistic design, data science, ML.
- Interested in data science, optimization of design and operations, decision making under uncertainty.
- Leading major EU-funded projects (Hiperwind, IntelliWind)

DTU

THE INDUSTRY PARTNER

Vestas

Close collaboration with Vestas
– the biggest wind turbine producer in Europe
- External stay at Vestas' R&D facilities in Aarhus, Denmark

Ewan Machefaux:

- Senior Specialist, Plant Modelling & Analytics, Systems Engineering

THE PROJECT

- Develop and test new AI-driven algorithms for Wind Farm Control, with emphasis on accuracy, reliability, and robustness;
- Include impact assessment to estimate the potential benefits of the AI-driven WFC strategies compared to physics-based approaches; and
- Assess the risk and uncertainties through uncertainty assessment involving e.g., ensemble modelling.

THE ACADEMIC CO-SUPERVISION PARTNER

(University of Granada)

Manuel Chiachio Ruano:

- Associate Professor, working with Bayesian Statistics, Prognostics methods, Risk Analysis, Artificial Intelligence, Structural Engineering.
- Just finished coordinating the very successful ENHANCE Doctoral Network

DC9

Optimal maintenance decision processes with transfer learning

THE HOST TEAM

Daniel Straub:

- Professor, expert in decision making under uncertainty, risk assessment, reliability analysis and probabilistic modelling.
- Outstanding research record and consultancy experience
- Head of the Engineering Risk Analysis Group

Iason Papaioannou:

- Senior researcher, expert in applied statistics and reliability analysis, data science, ML.
- Departmental PhD advisory award

THE NON-ACADEMIC PARTNER

IWES

Julia Walgern:

- Group manager technical reliability. Data science, reliability, ML&AI)

THE PROJECT

- Formulate and implement a data-driven framework to optimize maintenance actions directly from records of monitoring data and past maintenance activities at the wind farm level
- Enhance the performance of the methodology by developing and testing transfer learning in deep reinforcement learning
- Leverage the rich data sets available at IWES with SCADA data and maintenance records from a considerable number of windfarms and years to implement and test the concepts.

THE ACADEMIC CO-SUPERVISION PARTNER

ETH (ETH Zurich)

Eleni Chatzi:

- Professor, Chair of Structural Mechanics and Monitoring.
- Outstanding research record and ERC Grant award
- Currently the president of the EAWE (European Wind Energy Academy)

Questions? Go to www.menti.com and enter code 3335 9022

DC10

Knowledge-based platform for impact assessment of autonomous O&M on energy production

THE HOST TEAM

Manuel Chiachio Ruano:

- Associate Professor, working with Bayesian Statistics, Prognostics methods, Risk Analysis, Artificial Intelligence, Structural Engineering.
- Just finished coordinating the very successful ENHANCE Doctoral Network

Juan Chiachio Ruano:

- Associate Professor, working with Bayesian Statistics, Prognostics methods, Risk Analysis, Artificial Intelligence, Structural Engineering.
- Currently leading the major EU-funded project BuildChain

THE INDUSTRY PARTNER

QUANTIA

QUANTIA: A high-tech start-up, spin-off from UGR. Secure digital solutions for design, construction, maintenance and exploitation of assets.

Juan Fernández Salas

- Chief Technology Officer of QUANTIA
- AI, ML, Reliability, prognostics, and diagnostics

THE PROJECT

- Formulation of a holistic computational platform for integrated wind-farm information modelling using SHM data. High-Level Plausible Petri nets will be used as point of departure.
- Allow representation of heterogeneous data and to make the model self-adaptive, using Deep Reinforcement Learning;
- Enrich the resulting O&M intelligent model to dynamically integrate the windfarm KPIs and to follow the most convenient consensus policy based on the specific characteristics of the stakeholders involved. These policies might be of uncertain nature.

THE ACADEMIC CO-SUPERVISION PARTNER (DTU)

Athanasios Kolios:

- Professor, Reliability, lifecycle cost modelling, O&M optimization.
- Vast experience in international projects and industry collaboration

DC11 Robust predictive maintenance planning under imperfect deterioration models

THE HOST TEAM

Daniel Straub:

- Professor, expert in decision making under uncertainty, risk assessment, reliability analysis and probabilistic modelling.
- Outstanding research record and consultancy experience
- Head of the Engineering Risk Analysis Group

Iason Papaioannou:

- Senior researcher, expert in applied statistics and reliability analysis, data science, ML.
- Departmental PhD advisory award

THE INDUSTRY PARTNER

RAMBØLL

Moritz Häckell:

- Asset Management Offshore Wind, Structural Health Monitoring, Predictive Maintenance, Structural Dynamics

THE PROJECT

- Investigate the sim2reality gap in deterioration modelling and its implications for optimal maintenance;
- Develop robust approaches to prediction models under the sim2reality gap that apply self-learning and can correct biases as data becomes available;
- Develop robust approaches to sequential decision making under the sim2reality gap, focusing on RL strategies and their performance when trained on erroneous models.

THE ACADEMIC CO-SUPERVISION PARTNER

TU Delft

iSP

Dimitrios Zarouchas:

- Associate Professor, Director of Center of Excellence in AI for Structures, PHM.

Questions? Go to www.menti.com and enter code 3335 9022

DC12

Adaptability, flexibility, and generalizability of AI for fault detection

THE HOST TEAM

Estefania Artigao:

- Assistant Professor, O&M, ML, reliability, fault detection, predictive maintenance, drive train monitoring
- Deputy director of Quality and Business Relations at UCLM

Sergio Martinez:

- Assistant Professor, PhD. O&M, AI, machine learning, availability, and reliability of wind turbines, applied statistics.

UCLM

THE INDUSTRY PARTNER

SYDIS

SYDIS: Development, construction and operation of renewable energy projects

Jorge Cordoba:

- CEO, 18 years' experience in the field of renewable energies, operation & maintenance.

THE PROJECT

- Develop uncertainty quantification AI methods to detect, assess, and mitigate uncertainties, thereby improving operational resilience and overall performance in condition monitoring of critical components of the drive train (i.e., gearbox and generator).
- Machine Learning approaches based on Ensemble Learning and Online Learning will be implemented on high frequency SCADA data and high frequency current data to reduce uncertainty in fault detection of drivetrain components.

THE ACADEMIC CO-SUPERVISION PARTNER

DTU

Nikolay Dimitrov:

- Senior researcher, specializing in applied statistics and probabilistic design, data science, ML.
- Interested in data science, optimization of design and operations, decision making under uncertainty.
- Leading major EU-funded projects (Hiperwind, IntelliWind)

Questions? Go to www.menti.com and enter code 3335 9022

DC13 Decision support systems for automatic anomaly interpretation and ranking

THE HOST TEAM

Nikolay Dimitrov:

- Senior researcher, specializing in applied statistics and probabilistic design, data science, ML.
- Interested in data science, optimization of design and operations, decision making under uncertainty.
- Leading major EU-funded projects (Hiperwind, IntelliWind)

Athanasios Kolios:

- Professor, Reliability, lifecycle cost modelling, O&M optimization.
- Vast experience in international projects and industry collaboration

DTU

THE INDUSTRY PARTNER

ENGIE Digital: A subsidiary of the ENGIE group, building in-house software solutions, with a portfolio of 10 digital platforms

ENGIE digital

Nicolas Girard:

- More than 18 years of experience in wind asset management
- Managing the analysis product range of the DARWIN platform

THE PROJECT

- Develop a combination of anomaly detection and alarm prediction models based on SCADA data and alarm event records, aiming at predicting turbine downtime events before they occur;
- Provide a likelihood-based assignment of probable causes of an anomaly;
- Develop a risk ranking system considering the likelihood of triggering downtime or corrective actions

UCLM

THE ACADEMIC CO-SUPERVISION PARTNER

(University of Castilla-La Mancha)

Estefania Artigao:

- Assistant Professor, O&M, ML, reliability, fault detection, predictive maintenance, drive train monitoring
- Deputy director of Quality and Business Relations at UCLM

Questions? Go to www.menti.com and enter code 3335 9022

DC14

Development and Implementation of an Autonomous Decision Support System for Optimized Maintenance in Wind Turbine Infrastructure

THE HOST TEAM

Nikolay Dimitrov:

- Senior researcher, specializing in applied statistics and probabilistic design, data science, ML.
- Interested in data science, optimization of design and operations, decision making under uncertainty.
- Leading major EU-funded projects (Hiperwind, IntelliWind)

Athanasios Kolios:

- Professor, Reliability, lifecycle cost modelling, O&M optimization.
- Vast experience in international projects and industry collaboration

DTU

THE INDUSTRY PARTNER

Vestas

- The biggest wind turbine producer in Europe
- External stay at Vestas' R&D facilities in Aarhus, Denmark

Mehran Nourbaksh:

- Plant control and automation, O&M, predictive maintenance, digitalization

THE PROJECT

- Focusing specifically on faults that may cause degradation of the wind turbine and plant power generation performance
- Identify signals or metrics that can be indicators of the asset health state related to the faults being studied;
- Identify sensor solutions and data sources that can deliver the signals relevant for quantifying the performance metrics;
- Develop tools to automatically analyse sensor data

THE ACADEMIC CO-SUPERVISION PARTNER

(University of Granada)

Manuel Chiachio Ruano:

- Associate Professor, working with Bayesian Statistics, Prognostics methods, Risk Analysis, Artificial Intelligence, Structural Engineering.
- Just finished coordinating the very successful ENHANCE Doctoral Network

DC15

Secure IT framework for autonomous wind farm operation and maintenance based on blockchain, smart contracts and AI

THE HOST TEAM

Juan Chiachio Ruano:

- Associate Professor, working with Bayesian Statistics, Prognostics methods, Risk Analysis, Artificial Intelligence, Structural Engineering.
- Currently leading the major EU-funded project BuildChain

Manuel Chiachio Ruano:

- Associate Professor, working with Bayesian Statistics, Prognostics methods, Risk Analysis, Artificial Intelligence, Structural Engineering.
- Just finished coordinating the very successful ENHANCE Doctoral Network

THE INDUSTRY PARTNER

QUANTIA

QUANTIA: A high-tech start-up, spin-off from UGR. Secure digital solutions for design, construction, maintenance and exploitation of assets.

Juan Fernández Salas

- Chief Technology Officer of QUANTIA
- AI, ML, Reliability, prognostics, and diagnostics

THE PROJECT

- Development of a secure and trustable SHM platform for wind power plants combining AI algorithms, blockchain and smart contracts
- Research and development of a methodology to combine AI-based SHM/PHM algorithms with smart contracts
- Design of the architecture for the proposed framework/O&M platform
- Case study to demonstrate the benefits of the proposed approach

THE ACADEMIC CO-SUPERVISION PARTNER (UPORTO)

Filipe Magalhães

- Associate Professor, 20+ years of experience on the monitoring of structures and development of innovative tools for data processing.
- Databases with unique experimental data. Close collaboration with industry

DCA1

Imitation Learning from Observations and Experts Inputs for Fault Reaction Strategies

THE HOST TEAM

Eleni Chatzi:

- Professor, Chair of Structural Mechanics and Monitoring.
- Outstanding research record and ERC Grant award
- Currently the president of the EAWE (European Wind Energy Academy)

ETH

THE PROJECT

- Deliver a decision support tool to guide policies for treating unwanted faults and breakdowns that lead to downtime.
- Build a sequential decision support framework that can devise optimal reaction policies via Partially Observable Markov Decision Processes (POMDPs), capitalizing on the use of black box models;
- Fuse automated telemetry (monitoring data) and expert judgement into a decision support tool for automating mitigation actions.

THE INDUSTRY PARTNERS

RAMBØLL

Moritz Häckell:

- Asset Management Offshore Wind, Structural Health Monitoring, Predictive Maintenance, Structural Dynamics

Konstantinos Tatsis:

- Chief Scientific Officer, fusion of physics-based and data-driven models for real-time virtualization of wind turbine dynamics

RTDT

THE ACADEMIC CO-SUPERVISION PARTNER

(TU Munich)

Daniel Straub:

- Professor, expert in probabilistic modeling, risk assessment, reliability analysis and data analytics applied to engineering systems.
- Outstanding research record and consultancy experience
- Head of the Engineering Risk Analysis Group

How to apply and other additional info

Questions? Go to www.menti.com and enter code 3335 9022

Intelliwind.eu

- Website is up and running
- Listing the open PhD positions as well as other news
- This presentation will also be uploaded

Currently open positions

- Links also available on website
- Please apply directly to the host institution – - procedures may vary!
- Expected starting dates around January 2025

DC#	Host	
DC1	Siemens	Link to job posting
DC2	IWES	
DC3	UCLM	
DC4	Ventient	Available from next week
DC5	DTU	Link to job posting
DC6	TU Delft	Link to job posting
DC7	UPORTO	Available from next week
DC8	DTU	Link to job posting
DC9	TUM	Link to job posting
DC10	UGR	Link to job posting
DC11	TUM	Link to job posting
DC12	UCLM	
DC13	DTU	Link to job posting
DC14	DTU	Link to job posting
DC15	UGR	Link to job posting
DCA1	ETH Zurich	Link to job posting

Questions and answers – webinar 11-09-2024

Given the shared nature of the topics between the different PhD positions, more than one "DC" can be interesting to apply for. Is it possible to apply to multiple positions?

- Yes, it is possible to apply to more than one DC, and we encourage it.

What experience requirements in wind sector are needed for these roles? Are transferrable skills from other sectors considered?

- The MSCA Doctoral Networks are intended for training early-stage researchers, meaning that we do not require significant experience beyond a suitable M.Sc. Degree. Nevertheless, some relevant experience is of course a plus, including transferable skills from other sectors and from the wind energy sector.

What should I do if I believe I'm a good fit for a position that is based in the country I currently live in?

- Unfortunately, the mobility rule for MSCA-DNs requires that the candidate has not spent more than 12 months in the host country during the last 2 years.

Do the residency requirements still apply to the SERI-funded position?

- Please enquire directly with the hosts at ETH Zurich

Is it a joint doctoral degree as I saw for many positions there are two universities involved?

- No, only one degree will be obtained, from the host university

Can you bring more details about the role of the academic co supervisor ? The phd Student has to live in the host team city and part time in the other city ?

- Yes the PhD will primarily live in the host team city, but will for a period of 3-5 months live in the city of the academic co-supervisor and similarly at the industrial partner location. Apart from hosting the PhD during these “secondment” periods, the co-supervisors will regularly follow the project progress and contribute to online meetings and other joint activities.

What is the career pathway? Academic or Industrial?

- Both academic and industrial career pathways are feasible. Former MSCA graduates are currently occupying leading positions in both academic and industrial organizations, as evident in the composition of the current consortium. The Doctoral Candidates, with the help of their supervisors and the Training Coordinator, will draw a Personal Career Development Plan which will be regularly updated.

You mention that a lot is happening within the domain of wind turbine technology and operations & maintenance hereof. How does IntelliWind plan to stay adaptable to the fast-evolving nature of renewables?

- IntelliWind should not only be adaptable to the fast-changing nature of renewables, it should in fact trigger and contribute to such changes. This is the essence of cutting-edge research, as well as a requirement for obtaining a PhD degree. Each PhD project will need to first establish an overview of the state-of-the-art in their respective field, and then push beyond that.

IntelliWind webinar Q&A

Go to

www.menti.com

Enter the code

3335 9022

Or use QR code