



An overview of the DyVirt project: Opportunities and challenges

Dynamic virtualisation: modelling performance of engineering structures (DyVirt)

A MARIE SKŁODOWSKA-CURIE European Training Network
(764547)

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DyVirt ETN Overview



The overall aim of this European Training Network is, to *deliver a cohort of Early Stage Researchers who will be given the skills to create new research paradigms leading to radically improved dynamic virtualisation in **industrial** practice.*

Started in Feb 2018;

Funded by the European Commission via MARIE SKŁODOWSKA-CURIE Actions

Duration 4 years & Value £3.5M

A consortium of 5 Universities and 5 Industry Partners



What is a dynamic virtualisation?

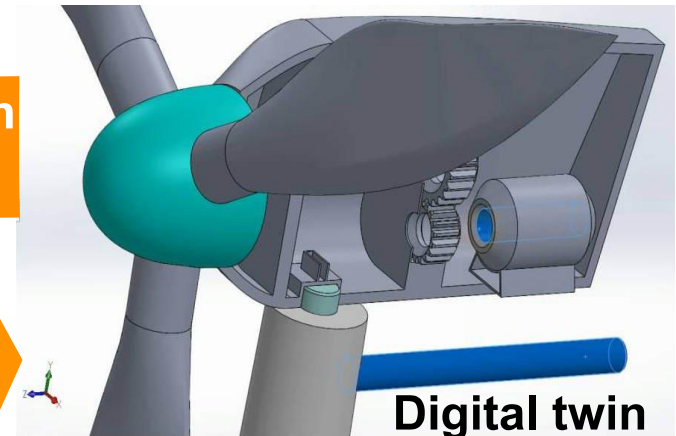


- Virtualisation (also called digital twin) is the process of creating a virtual duplicate (or twin) of the real structure/system
- This can be done through the design phase and/or throughout the life of the structure
- It is a fusion of models and data that evolves over time

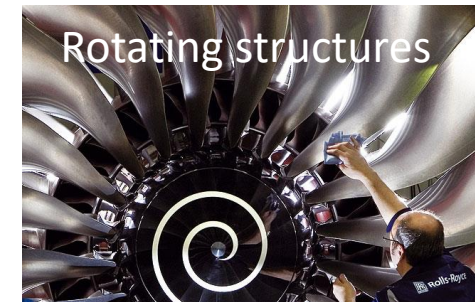


Design, operation
& management

Data, testing
& feedback



Application areas



Common theme: Dynamic operating environment

Early Stage Researchers



Atmaram Muraleedharan



Georgios Tsialiamanis



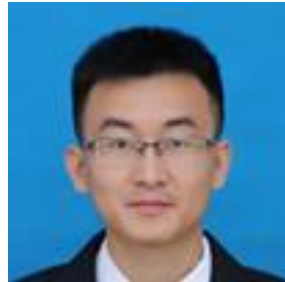
Siddhesh Raorane



Shreyas Srivatsa



Giancarlo Kosova



Xinyu Jia



Tulay Ercan



Silvia Vettori



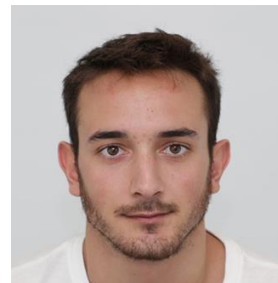
Paulo Gonzaga



Sebastian Kruse



George Pasparakis



Nikolaos Tsokanas

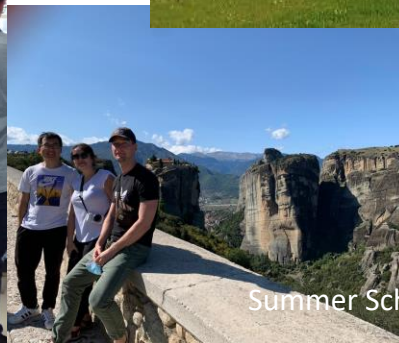


Tom Simpson



Iñigo Urcelay Oca

Events



Scientific workpackages



WP1: Fundamental aspects of Verification & Validation: Keith Worden, University of Sheffield

- Generative adversarial networks in structural health monitoring
- Uncertainty quantification in joined structures
- A NEAT approach to structural health monitoring

WP2: Model assembly and disassembly: Tadeusz Uhl, AGH University of Science and Technology Krakow

- Dynamic hybrid coupling of elastic wave propagation
- Multiscale modelling of MXene nanocomposites

WP3 - Uncertainty quantification and propagation: Bart Peeters, Siemens Digital Industries Software

- Coupled response-input estimation during environmental tests
- Hierarchical Bayesian modelling frameworks
- Optimal sensor placement
- Uncertainty quantification for models of wind turbine blades

WP4 - Characterising the operational and environmental envelope: Michael Beer Leibniz Universität Hannover

- Evolutionary power spectrum determination of linear and nonlinear systems
- Bayesian compressive sensing based evolutionary power spectrum estimation

WP5 - Reality enhancement: Eleni Chatzi, ETH Zurich

- Seismic response using hybrid simulation
- Nonlinear normal modes for nonlinear model order reduction
- Adaptive inverse control to virtual transfer systems

Summary and discussion



European Training Networks are important for:

1. Developing future leaders in the scientific and engineering domain
2. Contributing technological advancements to major societal challenges

In the DyVirt project we see those contributions as:

1. 14 excellent early-career stage engineers with expertise in topics relating to:
2. Sustainable energy generation, especially wind power
3. Improved virtualization capabilities for more efficient and sustainable engineering structures
4. Cheaper and more efficient health monitoring, asset- management and life extension of structures
5. Structures that are more resilient to extreme loadings such as wind, wave and earthquakes