Developing HUMS system for Whirl Tower utilising Audio Recordings

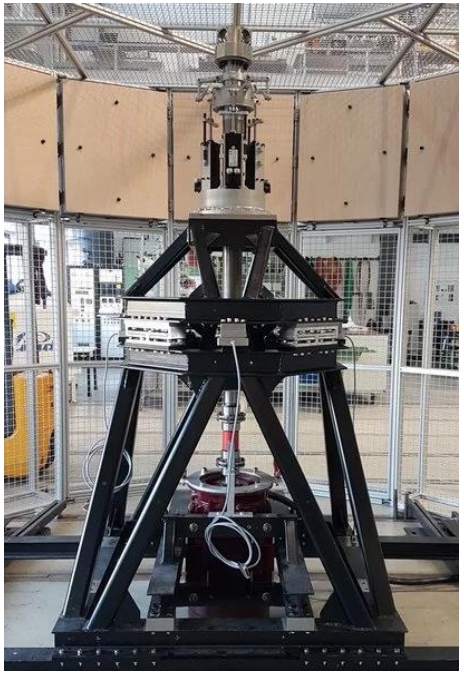
Background:

The MERIT Test Rig (pictured) is a Whirl Tower designed specifically for dynamic stall investigations in a rotating system. Due to the unpredictability and potentially destructive nature of dynamic stall, the real-time monitoring of key parameters of the test rig are of vital importance to ensure its safe operation. Currently the long-term health and usage monitoring of the test rig is gauged by human experience (i.e. if the operator notices an unusual sound, this will be investigated), however it would be beneficial to quantify this. The aim of the project would be to set up the workflow for all future experiments to gather the data that would inform the HUMS of the test rig.

Contact:
Matti Mitropoulos
matti.mitropoulos@tum.de
089 289 16370
Office: MW2701

Project Outline and Milestones:

- Literature Review on Audio-based HUMS methods in rotorcraft and/or aerospace in general
  - MS1: Expose outlining project
- Initial Testing to establish DAQ, Post-processing workflow including filters etc, and preliminarily settle on an experimental setup
  - MS2: Obtain frequency domain graphs and interpret results (e.g. frame eigenfrequencies, blade modes etc)
- Optimise Workflow to focus on different components as desired (e.g. Motor, Bearings, Swashplate)
  - MS3: Establish a plan to evaluate long term health developments over the coming years of experiments.



Prerequisites:

- Ideally some experience with audio equipment / signal processing
- Decisive and motivated work ethic