

PhD Project

Diagnostics and prognostics in SHM

The field of Structural Health Monitoring (SHM) is one of the most and rapid developing field in engineering. The idea to combine fault detection, diagnostics, system supervision, condition-based monitoring and prognostics online applicable within one scientific community was fruitful since two decades. Fault detection, isolation, diagnostics and prognostics, Acoustic Emission and related filtering is one of the key research fields of the Chair SRS (Dynamics and Control) in Duisburg. In the last years we establish several new approaches and we are proud to be able to publish highly recognized papers on an international visible level.

Important work was realized in combination

- with tribological systems regarding wear and aging,
- CFRP components with respect to damage detection and distinction,
- Remaining-Useful-Lifetime estimation based on newly developed data driven models,
- Acoustic-Emission based diagnostics of physical effects.

Beside the development of method(s) we validate our approaches using our own test equipment. In this research field we are working with our tribology test rigs, test rigs allowing itentation and movements of CFRP-structures etc. Measurements are done using FPGA-based measurement systems allowing us to measure signals up to 10 MHz. A brand-new only custom-made FPGA-based measurement systems was recently published.

The next intended research development steps should concentrate on

- detailed localization of AE-sources like cracks within CFRP and tribological structures,
- improving the distinguishability of effects as well as the detection rate of diagnostic statements,
- the integration and fusion of different diagnostic statements,
- the extension of existing prognostic approaches and
- other new ideas.

Therefore we need a student from the Mechanical or Electrical or Automation and Information Science field with

- i) engineering programming and/or VHDL-programming skills,
- ii) background in filtering and/or machine learning, and
- iii) two right hands.

If two of the three requirements are fulfilled, feel free to apply.

From the new candidate we expect that s/he is willing to become very fast an important and valuable member of our Chair.

Therefore we expect

- i) a shown and strong expertise in related scientific fields to be integrated,
- ii) your ability and commitment to develop and validate NEW methods and approaches, and

iii) your willingness and commitment to write scientific contributions on a world class level.

In case of interest please provide beside the usual application material (CV, grades, ...) material stating that you have strong English language skills (TOEFL IBT better than 95, IETLS better than 6.5) and a detailed and described interest ONLY in the described research fields. Your German language skills can be (if necessary) improved by language courses in parallel (for example at the Goethe Institute, Düsseldorf) (on your cost). For further information about the requirements see also the website of the Chair SRS: www.uni-due.de/srs/prospective.

About you:

Bachelor and Master degree in Electrical or Mechanical Engineering or Information science or Mathematics or Automation/Control (with strong interests in programming) (with clear related specification) necessary, deep interest in the field, excellent grades in related courses. Related and/or diverse qualifications can possibly also be very attractive.

About us:

Chair SRS (Head: Prof. Söffker) at U DuE, Germany:

With a mix of coworkers and PhD students the Chair has a strong and long tradition in supervising academic trainees. The internal organization scheme will allow an improved organization of the academic work of the PhD students in guided groups. Academic qualification includes not only the PhD topic related work but also advising coworking students (Bachelor/Master level) based on individual qualification and skills etc.

The PhD students working in the group are financed by the university or by public funding, financed by industry projects, by their home countries or by DAAD scholarships.

Be aware about the time schedule of your DAAD-application:

An application now or in September/October year 1 leads to the beginning of german language courses in May/June year 2 and start PhD research at the Chair SRS in October year 2.

In case of other application (government programs, national/university training programs):

You should be supported for more than 3,5 years. In case of support for less than 3,5 years, you should convince us based on existing international publications from the last five years.

The successful candidate is primarily directly related to:

Prof. Söffker (Scientific supervisor: Prof. Söffker)

Next steps:

1. Be aware of your national DAAD application deadline (which varies between February and November each year).
2. Contact Prof. Söffker directly by E-Mail (soeffker@uni-due.de, subject: DAAD-Appl. HMS) and send copy of CV, certificates, recommendation letters as well as a first proposal (2-3 pages) about your understanding of the intended topic, your intended working schedule, the state of the art in this field as well as the deduced definition of your project. A 'copy and paste'-strategy will disqualify you immediately.
3. Be aware about the time schedule of your application: DAAD example application in September/October year 1 leads to begin language courses in May/June year 2 and start PhD research in October year 2.
4. Joint improvement of the proposal: If the quality of the project proposal is finally fitting to the groups standard (=perfect) Prof. Söffker will invite you by writing the required acceptance letter.
5. The final decision is with the DAAD committees.



Chair of
Dynamics and Control

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