

PhD Project

Advanced Integrated Human-Machine-Systems (HMS)

Realtime modeling, qualification, and evaluation including human behavior prediction of Human-Machine-Interaction 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 journal papers on an international visible level.

Based on qualitative and also data driven/machine learning modeling techniques we are able to build cognitive-based descriptions of the interaction itself, related mental models etc. Based on cognitive functions and procedures action spaces can be calculated allowing to qualify the actual state of the interaction, to judge the quality and reliability of human decisions as well as to give situated recommendations to improve the quality and reliability of the interaction of human operator and system. In combination with other known approaches, advanced intelligent interfaces or interaction technologies has been developed.

Beside the development of method(s) we validate our approaches using our own test equipment. Using our professional driving simulator we are able to realize driver-in-the-loop experiments. In other projects the driving simulator is combined with our hybrid powertrain simulator (HIL-testrig with batteries, supercaps etc.). In an actual experimental project we are developing a new kind of interface for guiding autonomous inland vessels.

The next intended research development steps concentrate on

- the fusion of machine und human intelligence and behaviors with respect to functional and reliable function of the whole HMS system including reliability questions.
- the development of newly integrated intention recognition systems allowing to express intentions quickly and to detect them reliable.
- the development of newly coupled human-mechatronic systems for example for persons with a disability.

Therefore we need students from the HMI/HMS field and/or from the Human-Computer-Interaction field with i) strong engineering programming and/or interface design skills, ii) psychological background, and iii) automation/engineering background. 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.

Depending on the candidate's background this can be related to approaches defined by the following keyword set

A (Bayes, Dempster-Shafer, Cognitive ergonomy, Situation recognition, Cognitive frameworks, Planning, Advanced and reliable Machine Learning approaches, Cognitive Reasoning, Probabilistic theories for knowledge representation/inference/perception), Mode Awareness, Situation Awareness)

or

B (Human-Computer-Interaction, Interface Design, Programming, Realtime program).

Methods and competences **purely** related to the following keywords will not be considered: Ergonomics, Automotive Applications, Statistical Evaluation, Simulator research, Vehicle Technology, Neural networks

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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