Research Assistant Position (m/w/d)

Artificial Intelligence for Design of Personal Air Vehicles – AI methods

Temporary Position (initial contract of 3 years), up to Salary Level EG 13 TV-L, 100%

Background:
Aircraft for urban air mobility is attracting large investments from many large as well as startup companies in recent years. The choice of configuration in the design of eVTOLs (electric vertical take-off and landing) is even more challenging than for conventional aircraft because the design space is much larger. A variety of different concepts and configurations have been proposed for eVTOLs so far. The choice of aircraft configuration has always been a completely human-driven task, based on the designer’s knowledge and experience. The project seeks to introduce a novel methodology for the automatic design of eVTOL configurations using artificial intelligence. In this project, an AI-based design tool is developed that can automatically determine the best (optimal) configuration for an eVTOL with given top-level requirements. This method is based on a machine learning process using Bayesian statistics and combines a probabilistic model that can generate a variety of different eVTOL configurations using specific component definitions with machine learning scenarios. This AI model is combined with an analysis and optimization framework for eVTOL design.

Employment:
The position is located at the Institute of Aircraft Design and Lightweight Structures in Braunschweig. The entry date is as soon as possible, and the duration is 36 months. The payment is made according to task assignment and fulfillment of personal requirements up to salary group EG 13 TV-L. International applicants may have to successfully complete a visa process before hiring can take place. The TU Braunschweig strives in all areas and positions to reduce underrepresentation in the sense of the Niedersächsisches Gleichberechtigungsgesetz (NGG). Therefore, applications from women are especially welcome. Based on the NGG, the TU Braunschweig works on the fulfillment of the equal opportunity mandate. Where candidates have equal qualifications, preference will be given to female applicants. Candidates with handicaps will be preferred if equally qualified. Please enclose a proof.

Task:
The project includes applications of AI-based methods to overall aircraft design of eVTOL in collaboration with another research assistant who is supposed to work on development of overall aircraft analysis and optimization design methods. First design of universal probabilistic models will be defined in accordance
with aircraft-component definition. Modelling of geometrical parametrization of the aircraft components with dimensionality reduction methods will be investigated and performed as appropriate. Then, investigation of proper numerical techniques for the learning process of the models will be carried out by using test datasets. Generative models are used after the learning process to generate candidates to be refined with respect to aircraft performance by the optimization toolbox. The entire process with integration of the aircraft analysis and design toolbox will be developed and demonstrated with using real datasets of eVTOL.

Who we are looking for:
The requirements for this position are as follows:

- A master of science degree in aerospace engineering, mechanical engineering, computer science, mathematics, or comparable
- Knowledge and experience of machine learning, artificial intelligence
- Knowledge and experience of aircraft design are desirable
- Strong programming skills (Python, C++)
- Excellent communication skills in spoken and written English
- Creativity, positive attitude, and perseverance

Application Process:
Applications should be sent by e-mail to Dr. Daigo Maruyama (d.maruyama@tu-braunschweig.de) and must contain the following documents until 20.12.2022.

- Motivation Letter
- Curriculum Vitae including complete address, phone number, email address, educational background, language skills, and work experience
- Copies of bachelor and master diploma and transcript of grades in original language and in English or German translation
- Additional documents must be provided on request

All documents should be in PDF format, preferably in a single file. Personal data and documents relating to the application process will be stored electronically.

Please note that application costs cannot be refunded. For the purpose of carrying out the application process, personal data will be stored.