JÜLICH
Forschungszentrum

Apply your data science skills to real-world challenges!

At the Helmholtz School for Data Science in Life, Earth and Energy (HDS-LEE), we train the next generation of data scientists to tackle key global issues in domain sciences such as life, earth or energy. Learn more at https://www.hds-lee.de

Do you want to contribute to the future of personalized cardiovascular medicine by developing learning-based surrogate models for fast, reliable, and physics-aware predictions of blood flow and stress fields in patient-specific arteries? Working at the interface of computational mathematics and mechanics, scientific machine learning, and high-performance computing, you will help design innovative models that enable rapid and clinically meaningful predictions directly from medical imaging. You will join a highly collaborative research environment with strong expertise in data-driven learning algorithms, scientific machine learning, and GPU-accelerated implementations.

We are offering a

PhD position - GPU-accelerated parallel training of physics-aware neural networks for blood flow prediction within the HDS-LEE graduate school

Your Job:

We are looking for a PhD student to contribute to the development of fast, accurate, and physics-informed machine learning models for predicting blood flow in patient-specific vascular geometries. Current simulation-based approaches require complex 3D meshes and are often too slow for practical medical use. This project aims to create accurate and rapid surrogate models by combining physics-aware learning methods with domain decomposition techniques, enabling parallel training and efficient GPU-supported implementation.

Your tasks:

The job will be advertised until the position has been successfully filled. You should therefore submit your application as soon as possible. We look forward to receiving your application via our
Online-Recruitment-System!

Questions about the vacancy?
Get in touch with us by using **our contact form.**
Please note that for technical reasons we cannot accept applications via email.
www.fz-juelich.de

- Development of physics-aware ML models for 3D blood-flow prediction
- Integration of domain decomposition methods into the learning framework to enable efficient model parallel training
- Implementation and optimization of GPU-accelerated training pipelines
- Validation of models on patient-specific geometries obtained from MRI data
- Participation in conferences in Germany and abroad (incl. presenting your research results)
- Preparing scientific publications and project reports

Your Profile:
- Genuine interest in data science and one or more of its application domains: life and medical sciences, earth sciences, energy systems, or material sciences
- University degree (M.Sc. or equivalent) in applied mathematics or in computational engineering science, computer science, simulation science with a strong background in applied mathematics
- Excellent programming skills (Python, C/C++)
- Good experience in machine learning and parallel computing
- Good organisational skills and ability to work both independently and collaboratively
- Experience with deep learning frameworks, such as Tensorflow or Pytorch is advantageous
- Experience in numerical methods for partial differential equations is beneficial
- Effective communication skills and an interest in contributing to a highly international and interdisciplinary team
- Working proficiency in English for daily communication and professional contexts (TOEFL or equivalent or excemption required)
- Knowledge of German is beneficial

Our Offer:
We work on the very latest issues that impact our society and are offering you the chance to actively help in shaping the change! We offer ideal conditions for you to complete your doctoral degree:
- Outstanding scientific and technical infrastructure
- Highly motivated groups as well as an international and interdisciplinary working environment at one of Europe's largest research establishments
- Continuous scientific mentoring by your scientific advisors
- Chance of participating in (international) conferences
- Unique HDS-LEE graduate school program (including data science courses, soft skill courses and annual retreats) https://www.hds-lee.de/about/
- A qualification that is highly welcome in industry
- 30 days of annual leave and flexible working arrangements, including partial remote work
- Further development of your personal strengths, e.g. via a comprehensive training program; a structured program of continuing education and networking opportunities specifically for doctoral researchers via JuDocS, the Jülich Center for Doctoral Researchers and Supervisors: https://www.fz-juelich.de/judocs
- Targeted services for international employees, e.g. through our International Advisory Service

The position is limited to three years, with a possible one-year extension. Pay is in line with 75% of pay group 13 of the Collective Agreement for the Public Service (TVöD-Bund) and additionally 60 % of a monthly salary as special payment („Christmas bonus"). The monthly salaries in euro can be found on the BMI website: https://go.fzj.de/bmi.tvoed.entgelt

Further information on doctoral degrees at Forschungszentrum Jülich (including its various branch offices) is available at https://www.fz-juelich.de/en/careers/phd

The contract will be with Forschungszentrum Jülich, but the daily place of work will be at University of Cologne in the group of Prof. Dr. Axel Klawonn, with temporary periods at Forschungszentrum Jülich in the group of Dr. Andreas Herten.

We welcome applications from people with diverse backgrounds, e.g. in terms of age, gender, disability, sexual orientation / identity, and social, ethnic and religious origin. A diverse and inclusive working environment with equal opportunities in which everyone can realize their potential is important to us.

The following links provide further information on diversity and equal opportunities: https://go.fzj.de/equality and on specific support options for women: https://go.fzj.de/womens-job-journey