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www.flowsnr.github.io

EDUCATION

Dr.-Ing. in Machine Learning & Chemical Engineering — May 2021 – Feb. 2026
- *RWTH Aachen University, Chair for Chemical Process Engineering* — *Aachen, Germany*
  Summa cum laude

PUBLICATIONS

- **Towards a Physics Foundation Model** — Feb. 2026
  Under revision at ICML 2026, blog post, arxiv
- **Data Mining for Enhanced PEM Electrolysis** — Jan. 2026
  Journal of The Electrochemical Society, doi: 10.1149/1945-7111/ae335e
- **Modeling of Gas Diffusion Electrodes** — Jun. 2024
  ACS Applied Materials & Interfaces, doi: 10.1021/acsami.4c04641
- **Electrowetting and Reactions in Microfluidic Gas Diffusion Electrode** — Feb. 2024
  Small, doi: 10.1002/smll.202310427
- **Additive Manufacturing of Intertwined Electrode Pairs** — Oct. 2022
  Advanced Engineering Materials, doi: 10.1002/adem.202200986
- **Process Model for High Salinity Deionization** — Dec. 2020
  Journal of Membrane Science, doi: 10.1016/j.memsci.2020.118614

EXPERIENCE

- **University of Virginia** — Feb. 2025 – Now
  Visiting Scholar at the Visual Intelligence Laboratory — *Charlottesville, VA, United States*
  - **Multi-modal AI for Science**: Research on multi-modal datasets and models (physics & language)
  - **Physics Foundation Model**: Developed a Physics Foundation Model capable of modeling unseen physical systems purely from previous context.
  - **Research supervision**: Supervised research of two PhDs regarding Graph Neural Networks and Autoencoders.
  - **Student mentoring**: Mentored PhD students, fostering software engineering best practices and presentation skills.

- **RWTH Aachen University** — May 2021 – Feb. 2026
  PhD, Researcher — *Aachen, Germany*
  - **Group Leader TriggerINK Robotics**: Led the TriggerINK Robotics research team (5 PhDs) focused on robotic in-wound 3D-printing of an interactive bio-ink for supporting cartilage regeneration.
  - **Object Tracking with Synthetic Images**: Developed a mask-RCNN model trained on synthetic microscope images (rendered using Blender) to track microgels. Evaluated microgel flow using SORT and multi-hypothesis tracking algorithms.
  - **Thesis Supervision and Mentorship**: Managed 20+ undergraduate and graduate students and 5+ research assistants, fostering technical and personal development.
  - **Research Cooperation with University of Alberta**: Initiated a collaborative research effort between RWTH and the ESDLab at the University of Alberta, led by Prof. Marc Secanell.
  - **Research Project Management**: Managed a research project which was part of the H2Giga flagship project. The project had an investment budget of 500k Euro, a yearly budget of 10k Euro and a duration of 4 years.
  - **Teaching and Lectures**: Delivered lectures and tutorials for 3 years, enhancing student engagement.
  - **Lab Management**: Managed a large research laboratory (wet-lab) with around 10 active daily users.

PERSONAL PROJECTS - GITHUB

- **ML-training suite**: Boilerplate pytorch code for DDP, compile, amp, checkpointing, time keeping on HPCs.
- **CUDA kernel**: Custom CUDA kernel for masked convolutions.
- **N-body system simulator**: Toy C++ simulator for planetary movements.