Rushan Zhang

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Education

- *2024.08 - Present* **The Georgia Institute of Technology (Georgia Tech)**
  - PhD in Computational Science and Engineering
  - Advisor: Prof. Qi Tang
- *2024.08 - 2026.08* **The Georgia Institute of Technology (Georgia Tech)**
  - MS in Mathematics
- *2020.09 - 2024.06* **The Hong Kong University of Science and Technology (HKUST)**
  - BEng in Aerospace Engineering and BSc in Computer Science
  - Awardee of the Academic Achievement Medal (Approx. top 1%)
- *2022.08 - 2022.12* **The Georgia Institute of Technology (Georgia Tech)**
  - Exchange Student

Publication

- **Structure-Preserving Transfer of Grad-Shafranov Equilibria to Magnetohydrodynamic Solvers** (Paper, Presentation, Code)
  - **Rushan Zhang**, Golo Wimmer, Qi Tang
  - Journal of Computational Physics
  - Presented at MFEM Workshop 2025
- **DoNet: Deep De-overlapping Network for Microscopy Instance Segmentation** (Paper, Code)
  - Hao Jiang*, **Rushan Zhang***, Yanning Zhou, Yumeng Wang, Hao Chen
  - Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) 2023

Experience

- *2023.09 - 2024.06* **Designing a high-performance airfoil by advanced CFD and machine-learning methods** (Prof. Fu Lin@HKUST, Final Year Design Project for Aerospace Engineering)
  - Designing, implementing and evaluating machine-learning-based methods for airfoil shape optimization, and comparing results with numerical adjoint methods and experimental results
  - **Inspiration**:
    - Machine learning methods excel in identifying coarse global optima, while numerical adjoint methods excel in refining local optima
    - Combining these two methods could potentially yield improved results
- *2023.09 - 2024.06* **Adversarial or reinforcement learning-based closed-loop training strategy for PINN-based fluid simulators that generalize** (Prof. Dit-Yan YEUNG@HKUST, Final Year Project for Computer Science)
  - Designing, implementing and evaluating a closed-loop training strategy for PINN-based fluid simulator with adversarial or reinforcement learning, to achieve enhanced generalizability
  - **Inspiration**:
    - Closed-loop strategy can more efficiently explore the solution space
    - Training strategies like RL and AL can be used to form a closed-loop process
- *2023.06 - 2023.08* **Iterative surrogate model optimization for transient fluid structure interaction** (Prof. Dr. Robert Katzschmann@ETH Zurich, Summer Research Internship)
  - Designing, implementing and evaluating surrogate models for fluid structure interaction, conducting optimization with the resultant surrogate models
  - **Inspiration**:
    - Modeling transient fluid flow as a Markov process to enable single-step prediction of flow evolution
    - Introducing shape representation from the field of computer vision to enable monolithic modeling of fluid-structure interaction
    - Introducing active learning techniques to reduce the number of samples required for optimization
- *2022.02 - 2023.08* **Deep learning for medical image analysis** (Prof. Chen Hao@HKUST, Undergraduate Research Opportunity Program)
  - Designing, implementing and evaluating a novel de-overlapping strategy for semi-transparent cervical cell segmentation
  - **Inspiration**:
    - Using extra information from the overlapping area and the non-overlapping area to guide the segmentation of the whole cell
  - **Publication**: CVPR2023: DoNet: Deep De-overlapping Network for Microscopy Instance Segmentation
- *2021.06 - 2021.09*, **Digitalization of wet lab project** (WeShare Tech Limited, Student Helper)
  - Implementing the hazard warning feature with pop-up windows
  - **Role**:
    - Front-end development with Vue.js

Extracurricular Activities

- **Aerial robot development team member**, HKUST ENTERPRIZE Robo Master Team — 2020 Fall - 2022 Spring
    - Collaborating in a team for mechanical design and manufacturing of robots

- **Hackathon**, hackUST 2022 — 2022 Spring
    - Collaborating in a team for the development of a webapp called School Application Helper, helping students to manage school application requirements and timelines
    - Github repository; Video demo

- **Research assistant**, Prof. Ki Ling CHEUNG@HKUST — 2022 Summer - 2022 Winter
    - MySQL database maintenance and data washing with Dask
    - Providing technical support for researchers from different technical backgrounds

- **Peer mentor**, COMP & CPEG Mentor-Mentee Scheme — 2023 Fall
    - Providing mentoring to second-year students admitted to the computer science and engineering department

- **Exchange buddy**, Exchange Buddy Program — 2023 Spring, 2023 Fall
    - Helping exchange students navigate the HKUST campus

Skills

- **C/C++**: C++(intermediate), C(elementary); notes: C++ basic notes, C++ OOP notes
- **Python**: PyTorch(master), NumPy(master), TensorFlow(intermediate), Django(intermediate), Pandas(intermediate)
- **CAD**: SolidWorks(master)
- **Documentation**: Markdown(master), LaTeX(master)
- **Webapp Development**: Vue.js(intermediate), React.js(elementary), MySQL(intermediate), Google Firebase(elementary)
- **Soft Skills**: Collaboration and leadership, self-learning, self-motivation, time management