Delin An

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EDUCATION

- **University of Notre Dame, (09/2022 - Present)**
  - Ph.D. Student in Computer Science and Engineering, GPA: 3.8/4.0
  - Research Interests: Advanced AI methodologies for medical image processing and data analysis
  - Awards: Scientific Artificial Intelligence (SAI) Graduate Fellowship, Spring 2025; Zahm Professional Development Fund, Spring 2025
- **Xi'an Jiaotong University (XJTU), 09/2019-06/2022**
  - M.Eng. in Mechanical Engineering, GPA: 86.28/100
  - Research area: design and visual perception study of lower limb ankle lasso exoskeleton
  - Honors: Special Scholarship, academic year 2019, 1st Class Scholarship, academic year 2020
  - Awards: 3rd Prize in National Graduate Robotics Contest, Grand Prize in Robot Creativity Contest
- **University of Electronic Science and Technology of China (UESTC), 09/2015-06/2019**
  - B.Eng. in Mechanical Engineering, GPA: 3.61/4.0, Ranking: 10%
  - Research area: the system design and key technology of the main transmission of machine tool
  - Honors: Outstanding Graduates, academic year 2019, People's Second Scholarship, academic year 2017, People's Third Scholarship, academic year 2016

PUBLICATIONS

*Multiple first-author publications in **IEEE TVCG** and **Science Advances**; recipient of the Notre Dame **SAI Fellowship** and **Zahm Award**.*

- **Delin An**, Pan Du, Jian-Xun Wang, and Chaoli Wang. AortaDiff: Volume-Guided Conditional Diffusion Models for Multi-Branch Aortic Surface Generation. *IEEE Transactions on Visualization and Computer Graphics (IEEE Vis 2025)*, 2026.
- Pan Du*, **Delin An***, Chaoli Wang, and Jian-Xun Wang. AI-Powered Automated Model Construction for Patient-Specific CFD Simulations of Aortic Flows. *Science Advances*, 2025. DOI: 10.1126/sciadv.adw2825. (*Co-first author)
- **Delin An** and Chaoli Wang. SurfPatch: Enabling Patch Matching for Exploratory Stream Surface Visualization. *IEEE Transactions on Visualization and Computer Graphics*, 2025. DOI: 10.1109/TVCG.2025.3567133.
- **Delin An**, Pengfei Gu, Milan Sonka, Chaoli Wang, and Danny Z. Chen. Sli2Vol+: Segmenting 3D Medical Images Based on an Object Estimation Guided Correspondence Flow Network. *IEEE/CVF Winter Conference on Applications of Computer Vision*, 2025. DOI: 10.1109/WACV61041.2025.00357.
- **Delin An**, Pan Du, Pengfei Gu, Jian-Xun Wang, and Chaoli Wang. Hierarchical LoG Bayesian Neural Network for Enhanced Aorta Segmentation. *IEEE International Symposium on Biomedical Imaging*, 2025. DOI: 10.1109/ISBI60581.2025.10980947.
- **Delin An**, Aibin Zhu, Xian Yue, Diyang Dang, Yulin Zhang, Environmental obstacle detection and localization model for cable-driven exoskeleton, *International Conference on Ubiquitous Robots*, 2022. DOI: 10.1109/UR55393.2022.9826283.
- Xian Yue, Aibin Zhu, Peifeng Ma, **Delin An**, Diyang Dang, Yulin Zhang, Research on Lower Limb Rehabilitation Exoskeleton Control based on Improved Dynamic Motion Primitives, *International Conference on Advanced Robotics and Mechatronics*, 2022. DOI: 10.1109/ICARM54641.2022.9959156.

- Xian Yue, Aibin Zhu, Jiyuan Song; Guangzhong Cao; **Delin An**; Zhifu Guo, The Design and Implementation of Human Motion Capture System Based on CAN Bus, *International Conference on Ubiquitous Robots*, 2020. DOI: 10.1109/UR49135.2020.9144858.

RESEARCH PROJECTS

- **AortaDiff: Volume-Guided Conditional Diffusion for Multi-Branch Aortic Surface Generation (2025)**
  - Enable accurate, CFD-ready 3D aortic surface construction with minimal annotation effort
  - Developed a volume-guided conditional diffusion model generating aortic centerlines from CT/MRI, automatically extracted contours, and reconstructed smooth multi-branch surfaces via NURBS fitting
  - Produced CFD-compatible meshes with high geometric fidelity, effective even with limited data, successfully modeling both healthy and pathological aortas (aneurysm, coarctation)
- **AI-Powered Automated Model Construction for Patient-Specific CFD Simulations (2025)**
  - Automate vascular model creation to accelerate and improve CFD-based hemodynamic analysis
  - Proposed an end-to-end pipeline integrating a Bayesian LoGB-Net segmentation module with a GNN+LDDMM surface deformation model for anatomically consistent, unsupervised mesh refinement
  - Achieved state-of-the-art segmentation on public datasets, generated accurate CFD-ready models, and demonstrated improved prediction of pressure and wall shear stress compared to manual reconstructions
- **SurfPatch: Exploratory Stream Surface Visualization Framework (2024)**
  - Facilitate efficient exploration of complex flow fields
  - Designed a patch-matching algorithm with a hierarchical three-stage pipeline (vertex → patch → surface) and developed an interactive UMAP-based interface
  - Enabled multiscale partial-query analysis and demonstrated effectiveness on diverse datasets
- **Sli2Vol+: Object Estimation Guided Correspondence Flow for 3D Medical Image Segmentation (2024)**
  - Reduce annotation cost for 3D medical segmentation
  - Introduced an object estimation-guided correspondence flow network to propagate labels across volumes
  - Outperformed baselines on nine public CT/MRI datasets, showing robustness across anatomical regions with reduced annotation effort
- **Visual Perception Control Project of Exoskeleton Robot (2022)**
  - Improve adaptability of exoskeletons to outdoor terrains
  - Built a CNN-based terrain perception and finite state machine control system for gait switching
  - Enabled automatic gait adjustment, reducing wearer energy expenditure
- **Ankle Cable-Driven Exoskeleton Robot Design and Development (2021)**
  - Assist elderly mobility through lightweight wearable robotics
  - Designed and fabricated a cable-driven ankle exoskeleton with FEA validation and impedance control
  - Reduced the ankle joint torque and the wearer's metabolism meanwhile lightweight and easy to wear

TECHNICAL SKILLS

- Programming: Proficient in Python (Pandas, NumPy, SciPy, Matplotlib, Selenium, BeautifulSoup), C++, and C. Skilled in advanced Python protocols (sequence, context manager, descriptor).
- Machine Learning and AI: Expertise in PyTorch and MxNet frameworks for deep learning, including segmentation, gradient optimization, tensor calculations, and distributed training.
- Medical Image Processing: Experienced in 3D medical image segmentation, correspondence learning, and Bayesian uncertainty quantification.
- Software Tools: Proficient in PyCharm, Visual Studio, MATLAB, Origin, Photoshop, and Illustrator for data analysis and algorithm development.