

# Delin An

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## EDUCATION

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### ■ 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: 3<sup>rd</sup> 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

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*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

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- **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 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
- **Sl2Vol+: Object Estimation Guided Correspondence Flow for 3D Medical Image Segmentation (2024)**
  - Reduce annotation cost for 3D medical segmentation
  - Introduced an object correspondence flow network to propagate labels across volumes
  - Outperformed baselines on nine CT/MRI datasets with minimal annotation
- **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

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- **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, generative AI technologies, correspondence learning, and Bayesian uncertainty quantification.
- **Software Tools:** Advanced computational and engineering software, including SolidWorks, MATLAB, Keil, and OpenFOAM, for algorithm development, embedded systems, and fluid simulation.